"Step after step the ladder is ascended."—George Herbert, *Jacula Prudentum.*

"Agriculture is the most healthful, most useful and most noble employment of man."—Washington.

THE TROPICAL AGRICULTURIST:

(ESTABLISHED 1881.)

A MONTHLY RECORD OF INFORMATION FOR PLANTERS

OF

TEA, CACAO, COFFEE, PALMS, RUBBER, CINCHONA, SUGAR, RAMIE, COTTON, TOBACCO, SPICES, CAMPHOR, RICE,

AND OTHER PRODUCTS SUITED FOR CULTIVATION IN THE TROPICS:

Circulating in India, Ceylon, Burma, Straits, Java, Sumatra, Borneo, Northern Australia, Queensland, Fiji, Mauritius, Natal, West Indies, South and Central America, California, Southern States, and throughout Great Britain:

EDITED BY

J. FERGUSON,

of the "Ceylon Observer," "Ceylon Handbook and Directory," *&c.*

"It is both the duty and interest of every owner and cultivator of the soil to study the best means of rendering that soil subservient to his own and the general wants of the community; and he, who introduces, beneficially, a new and useful *Seed, Plant or Shrub* into his district, is a blessing and an honour to his country."—Sir J Sinclair.

VOL. XVII.

[Containing Numbers I to XII.: July, 1897, to June, 1898.]

CEYLON: A. M. & J. FERGUSON, COLOMBO.

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MDCCCXCVIII.

TO OUR READERS.

In closing the Seventeenth Volume of the "**Tropical Agriculturist,**" we would as usual direct attention to the large amount of useful information afforded and to the great variety of topics treated in the several numbers. From month to month, we have endeavoured to embody in these pages the latest results of practical experience and scientific teaching in all that concerns tropical agriculture; and our ambition has been to make our periodical not only indispensable to the planter, but of service to business men and capitalists, never forgetting that agriculture trenches upon every department of human knowledge, besides being the basis of personal and communal wealth.

While directing our attention chiefly to the products prominently mentioned on our title-page, we have always taken care to notice minor industries likely to fit in with sub-tropical conditions; and our readers have an ample guarantee in the index pages before them, that, in the future, no pains will be spared to bring together all available information both from the West and East, the same being examined in the light of the teachings of common sense as well as of prolonged tropical experience in this, the leading Crown and Planting Colony of the British Empire.

Special attention has, during the past year, been given to the extension of the fibre industry (in rhea especially); rubber; cacao in Central America and the West Indies as in Ceylon; coffee and allied products in Brazil, Mexico, Costa Rica, East Java, Nyassaland, British Central Africa; Liberian coffee in Sumatra, Java, the Straits Settlements; and to other new developments in coffee, coconuts and tobacco planting, &c., in the Malayan Peninsula and North Borneo, as well as in this Island.

The Tea-planting Industry has sprung into so much importance in India (South as well as North) and Ceylon, as also in Java, that a considerable amount of space is naturally given to this great staple; and we think it will be admitted by impartial judges that the *Tropical Agriculturist* should be filed, for the convenience of planters, in every Tea Factory in this Island, in India and in Java.

A full and accurate Index affords the means of ready reference to every subject treated in this, the Seventeenth volume, which we now place in our subscribers' hands, in the full confidence that it will be received with an amount of approval, at least equal to that which has been so kindly extended to its predecessors.

To show how fully other Products besides Tea are treated in this volume, we may mention the number of entries under several headings as follows:—Coffee (including Liberian) 85; Cacao 25; Indiarubber 34; Coconuts and other Palms 30; and Miscellaneous Products nearly 1,000. In the 17 Volumes, the references to Rubber, Coffee, and Cacao number many thousands, as also to Coconuts and other Palms.

We are convinced that no more suitable or useful gift can be made to the tropical planter or agriculturist, whether he be about to enter on his career, or with many years of experience behind him, than the seventeen volumes of our periodical which we have now made available. They are full of information bearing on every department and relating to nearly every product within the scope of sub-tropical industries.

In conclusion, we have to tender our thanks to readers and contributors, and our wish that all friends may continue to write instructively and to read with approval; for then, indeed, must the "**Tropical Agriculturist**" continue to do well.

J. FERGUSON.

COLOMBO, CEYLON; 4TH JULY, 1898.

☞ All Planters of New Products or Pioneers in new lands should not fail to order this periodical as their best instructor.—Every Tea Factory, Coffee or Cacao Store, ought to have a file of the TROPICAL AGRICULTURIST, which contains a vast amount of information about Tea, and a Record of the Tea and other Produce Sales.

Among the OLD COLONISTS AND PLANTING PIONEERS whose portraits with biographical notices, are likely to appear in this new Volume, are Messrs. F. R. and W. SABONADIERE, THOS. WOOD, W. BOWDEN SMITH, C. TOTTENHAM, JOHN CAPPER, R. E. LEWIS, &c.,

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ORDER FOR THE

"TROPICAL AGRICULTURIST."

....

....1898.

Sirs,

Please forward the above publication from the beginning of Vol. XVIII, *1st July 1898.*

Please send also (lettered as for.................... ....*Estate)*

Vol. I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII, XIII, XIV, XV, XVI, AND/OR XVII, *for* 1881-2, 1882-3, 1883-4, 1884-5, 1885-6, 1886-7, 1887-8, 1888-9, 1889-90, 1890-91, 1891-2, 1892-3, 1893-4, 1894-5, 1895-6, 1896-7, AND/OR 1897-8.

I am, Sirs,

Yours faithfully,

....

To Messrs. A. M. & J. FERGUSON,

"CEYLON OBSERVER" OFFICE,

COLOMBO, CEYLON.

SUBSCRIBERS TO THE

"TROPICAL AGRICULTURIST"

are reminded that with the June Number, already received by them, and the Index and Title-page now issued, the SEVENTEENTH VOLUME (1897-98) is closed.

SUBSCRIPTIONS are due payable in advance for 1897-98, at the following rates:—

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☞ Those who have not settled for past subscriptions are requested to do so by return of Post, and to send Cheque, Post Office Order, or Bank Draft, in favour of A. M. & J. FERGUSON, Colombo.

Covers for binding the Seventeenth Volume, July 1897 to June 1898 (870 pages) can be obtained for R1·50. Cost of binding and cover R2·50.

WHAT IS THOUGHT OF

THE "TROPICAL AGRICULTURIST."

A gentleman resident in the Central Province, who has as good opportunities of knowing what is of benefit to Planters as anyone we know, sent us the following explicit testimony to the value of the *T.A.*":—

"Since its commencement, I have regularly seen and perused the *Tropical Agriculturist*. There can be but one opinion that its scope and object are highly important, and that it supplies a distinct desideratum, which it is to the interest of every estate proprietor to have available in the bungalow for the use of his *locum tenens*, or superintendent. As a magazine it provides varied and instructive fresh literature at intervals; deprived, as most in Ceylon are, of easy access to libraries; and as years go by it will growingly become 'The Ceylon Encyclopædia' with reference to agricultural operations. Viewing estate property as practically a permanent investment to any proprietor, the trifling charge of R12 per annum—a rupee a month—is certainly of no account, provided the separate numbers are kept, and bound together yearly as a book of reference, for the benefit of the manager and his successors. In that light, as the property of an estate to be handed over just as much as its office furniture, few proprietors would probably refuse to authorise its being taken and filed regularly (if the periodical was brought under their notice), more especially as on looking over the most recent volume one cannot fail to see how much valuable information on 'Tea' has been collated. In the belief that 'Tea' has restored prosperity to Ceylon, and that plantation property is a good investment for capitalists, such should not omit the office and connected equipment so advisable on all 'pucka' estates, a part of which should be the *Tropical Agriculturist*. I find I have gone on writing, but, as I am getting the numbers for the past year ready to be bound, the volume is before me."

THE VALUE OF THE "*T.A.*" TO CEYLON ESTATE OWNERS.—A planting correspondent wrote some time ago:—"I think proprietors should supply every tea estate with the *T.A.* The information in it with regard to everything in connection with tea &c. is invaluable: it would pay its value over and over again. Owners of estates should not leave it to hard-up superintendents to take it in."

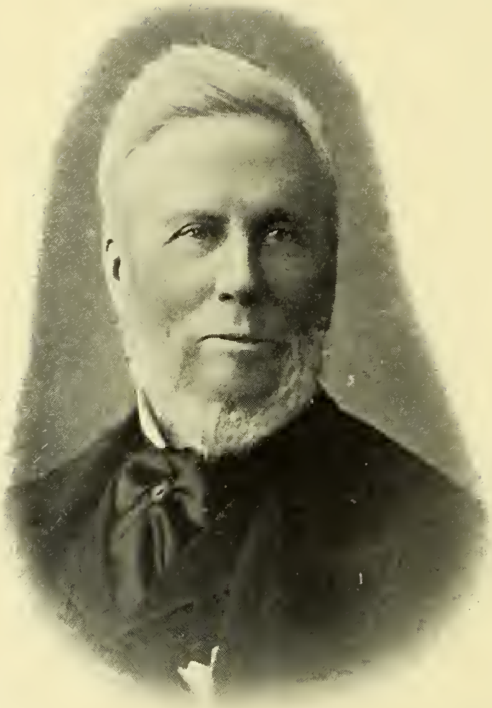
A Correspondent writes:—"I venture to say the volumes of the *Tropical Agriculturist* will be at a premium a few years hence: it is a book which is bound to rise in value as time rolls on, and subscribers will probably, if they so choose, be able to sell at a handsome profit, besides having had the benefit of using the information in the meantime."

From a Proprietor:—"I wonder how many planters know what they lose in not subscribing to your wonderful publication? The cost is absolutely nothing, compared to the convenience of having in a bound book all that is interesting and necessary in the literature of their calling. Information culled from a thousand sources, price lists of all produce sold locally, and home advertisements not seen elsewhere, and a hundred other things necessary for them to see and to know. The *T.A.* is, in fact, a convenient file of useful information daily arising and permanently preserved."

Mr. W. T. Thistleton Dyer, F.L.S., C.M.G., of Kew Gardens:—"Sir Joseph Hooker and myself always look out for the successive numbers of the *T.A.* with eagerness, and I keep a file in my office for reference. It is impossible to speak too highly of the utility of such a publication and of the way it is managed."

Sir George King, late of the Calcutta Government Museum:—"I know your *Tropical Agriculturist* well, having carefully secured every number since the beginning. You have succeeded in making it a wonderfully useful magazine of information for planters.

Surgeon-Major Bidie, F.L.S., of the Government Central Museum, Madras:—"I find the *Tropical Agriculturist* a most interesting and useful publication. It finds a place on the table of our Public Library and is much prized."



SAMUEL BUTLER.

The TROPICAL AGRICULTURIST
MONTHLY.

Vol. XVII.] COLOMBO, JULY 1ST, 1897. [No. 1.

"PIONEERS OF THE PLANTING ENTERPRISE IN CEYLON."

(Second Series.)

SAMUEL BUTLER,

PLANTER AND MERCHANT: 1837-1893.

THE late Samuel Butler was one of the founders of the well-known firm of Messrs. Darley, Butler & Co., of Colombo, He left Ceylon in the year 1858, though continuing to be a working partner in his old firm. Few or perhaps none of those who knew him in Ceylon remain, and very few even in England. Mr. Butler, a Worcestershire man, came to Ceylon in 1837 (a year which also saw the advent of the late R, B. Tytler and A. M. Ferguson) in the earliest days of Coffee Planting, and when opinions were unsettled about soils and climates suitable for the growth of the coffee shrub—especially in reference to climate as influenced by elevation. At that early time large clearings had been made and coffee planted at Udagama on the Gindura river in the Galle District, which ultimately had to be abandoned. Mr. Butler, if not the first, was one of the earliest to demonstrate practically that an elevation not under 1,500 to 2,000 feet was necessary for successful cultivation, by opening land in Sabaragamuwa near Balangoda with success. It may be observed that in later years, preference was given to an ever-increasing elevation, as more and more forest was cleared,—experience showing that the quality of the berry improved in proportion to the elevation within limits. After his Sabaragamuwa experience of jungle life, Mr. Butler became the planting partner in the firm of Acland, Boyd & Co., who were engaged in the largest planting operations of that decade in Ceylon. When it may be said that, besides the high roads to Galle, Kandy, Pussellawa, Matale, Kurunegala and a very few more, no other roads worthy the name existed in the planting districts, the physical endurance and perseverance of Mr. Butler and the enterprising pioneers who penetrated the remoter forests and selected lands for cultivation, may be, in some degree, estimated. Mr. Butler possessed the qualities we describe, in a high degree, and the result of his labours remain to this day in fine properties on the Knuckles range,—where he was about the earliest to select land—in Dumbara and in Dolosbage, which he selected and brought into cultivation with the aid of a small army of young men under his direction. It may be added here, that a number of the men who passed their early days in this valuable school, became successful planters and proprietors in later years. Roads to the new properties were a first necessity, and Mr. Butler was their pioneer. Some, like the Knuckles road, he traced himself; others were traced under his direction, which though improved and added to afterwards,

owed to him their initiative. The value of the work of men like Mr. Samuel Butler, the Shands in Sabaragamuwa and others, besides the labours of officials like Major Skinner and Captain Evatt of the Public Works Department in opening up the wilds of the interior, cannot be properly estimated at the present day. The difficulties in connection with Supplies, Labour, Money, Letters, &c. (money had to be brought up from Colombo to the estates in hard cash monthly) are now comparatively unknown; but in the days we speak of they sorely tried the patience and resources of hardworking men to overcome.

Reference to the *Government Gazette* in 1841, 1842 and 1843 would probably show a larger extent of acreage of land put up for sale and bought for planting purposes, than in almost any three years later, until we get to the rush of the "sixties" and "seventies." In the following years much plantation-grown coffee began to reach England from Ceylon, adding to very sufficient supplies from the West Indies, which had not then declined in production, as they afterwards did, under the combined influences of Slave Emancipation and Free Trade. All this seriously affected prices in the home market, and brought trouble to the many pioneers engaged in Ceylon, both to proprietors and to those whom they employed. There were exceptions, but almost universally, economy had been disregarded, and lavish and indiscriminating expenditure had prevailed, so that a crisis was approaching, in which many estates had to pass into other hands; and all property in the country depreciated. Mr. Butler was, we believe, the first Manager or Inspector of Estates to draw up and print a form of plantation accounts, on the basis of analysis of expenditure, which with variations became generally adopted. Mr. George Crabbe, of Messrs. A. & R. Crowe & Co., at that time being one of the first to call upon superintendents to curtail expenses on weeding; an item which, for want of analysis, covered extravagance in many other directions.

The labours of Mr. Butler as a planting manager were now soon to cease; the house of Messrs. Acland, Boyd & Co. came down in the commercial crash of 1847, and Mr. Butler had to pass through the troubles resulting from the insolvency of his firm. This to him proved to be a not unmixed evil. With his usual energy, he accepted a Power of Attorney from Mr. J. P. Simpson, then leaving for England, whose sister he had recently married. This introduced him to an acquaintance with the Import trade of which he did not fail to take advantage when the time came. Mr. E. J. Darley, another partner of Messrs. Acland, Boyd & Co., had retired from the firm before the failure, and had gone to England, where he found the greater number of the proprietors for whom the old firm had acted as agents, only too glad to place their estates in his charge. Returning to Ceylon Mr. Darley established himself as Darley & Co., but shortly joined by Mr. Butler he constituted the firm of Darley, Butler & Co. The new firm's business consisted chiefly of Estate Agency and Commissions. At this time Mr. Butler paid a visit to England, which proved to be an epoch in the future prosperity of the house. Forming a connection with the financial house of Matheson & Co., of London, a large Import business was commenced, to which was soon added equally large transactions in Ceylon produce. Shipping, both consigned and chartered, naturally followed. About this time was established their branch house at Cochin on the Western Coast of India, and ably conducted by Mr. Stephen Darley, brother of Mr. E. J. Darley, it proved a successful venture. Early in 1856, Mr. E. J. Darley, the senior partner, left Ceylon for a trip to England, which was lengthened out to three years, Mr. Butler conducting the business in the meantime; but falling into bad health, in 1858, under medical advice he went home in October of that year, Mr. Darley returning three months after. A short time before, the Governor Sir Henry Ward had placed Mr. Butler in the Legislative Council where his energetic character and abilities for business would soon have distinguished him, had not his departure for Europe, necessitated by ill-health, put a premature end to his career in that position.

This visit home proved to be a permanent stay, and also proved another important epoch in the fortunes of Messrs. Darley, Butler & Co., by the ultimate establishment of a house in London with the style of Darley & Butler. Mr. Darley, senior, returned to England about four years later, his son Edward being sent to Bombay to join Mr. Stewart of Manchester in establishing a branch there, while Mr. Stephen Darley returned to Colombo as partner with a chief assistant in Mr. W. W. Mitchell, who soon after became partner in the firm, with which he has been identified ever since. These were the years of the American Civil War and the consequent Manchester Cotton Famine. The firm, led by Mr. E. J. Darley, went boldly into the purchase of Tinnevelly cotton, both in the first and second years of the strife. These transactions resulted in handsome fortunes for themselves and their two partners, Messrs. Edward and Stephen Darley. The two latter shortly after left the firm, and Mr. Mitchell became the sole partner in Ceylon, both Messrs. Darley and Butler continuing in business in London. Early in 1870 Mr. Darley, senior, died, his share and capital passing out of the concern, and Mr.

Butler taking upon himself the responsibility conducted the London business, until his retirement in 1895. Mr. Butler's spirit of enterprise was not ended by the removal of Mr. Darley. On the failure of Messrs. A. and R. Crowe & Co. soon afterwards, his firm took over their premises and Cotton Agency at Tuticorin. After the cotton gains he purchased the estate of Combe Hay, near Bath, which he greatly improved with his usual thoroughness, at a considerable additional expense to the first cost of the property. He discovered a deposit of Fuller's-earth on the land, which when he came to sell the estate not very long before his death, assisted to break the fall in the value of land, which has taken place during the last twenty years. He was a Magistrate of the County of Somerset and a most energetic member of the Bench. Some years ago, he offered himself as Member of Parliament, but without success, for Chippenham and in the Liberal interest. His first wife died in 1887, and he married again in 1889, and soon after, accompanied by his wife paid a visit to Ceylon and India. He died after a short illness on the 27th September, 1893, aged 78, retaining all his faculties to the last.

Mr. Butler as a man of business was bold, enterprising and decisive, holding to the maxim "Nothing venture, nothing have." Generous by nature, liberal in business, reserved to strangers and even to intimates, but genial to his friends, he possessed in a marked degree commercial genius, sagacity and initiative, and a wonderful discernment of character.

We are indebted to a very old friend of Mr. Butler—one who had been a colleague with him in business in Ceylon in the early days—for the above interesting account of his career, written *currente calamo*, but which has required very little emendation at our hands. We observe only one notable omission, namely, the connection of Mr. Butler's nephew, Mr. Theodore Stretch, with the Colombo Firm thirty years ago, and the fact of Mr. Stretch returning home to join the London house where he is now sole representative of Messrs. Darley & Butler of London and Tuticorin. Mr. Butler left Ceylon before our day; but we were much struck during an interview in his London office, with Mr. Butler's grand physique even in his old age, with his continued interest in Ceylon affairs, and his thorough acquaintance with the development of the Colony. To Mr. Butler, more than to most men in our gallery of portraits, belongs the designation "Pioneer" in its most literal and honorable sense; for he contributed very largely to the raising of Ceylon from a military dependency to a great plantation settlement and the first of Crown Colonies; while his whole planting and mercantile career was marked by unwearied perseverance, lively intelligence and strictest sense of probity. The name of Mr. Samuel Butler as Colonist, Planter and Merchant is one well worthy of being recorded in the annals of the Colony.

EDWARD J. DARLEY, MERCHANT: 1836-1869.

Although we have no portrait available, nor such facts as would be required for a regular memoir, still a few words may be permitted about Mr. Butler's partner—another old mercantile Colonist—Mr. Edward J. Darley. Mr. Darley came to Colombo originally in 1836, as a trained Assistant to the firm of Messrs. Acland, Boyd & Co., and the story of his starting on his own account on the failure of his employers, is narrated above; as also how he took Mr. Butler into partnership; but it is more fully related in the following communication from an old friend:—

"What can be said of Mr. E. J. Darley?—except that he was a good and kind man greatly respected and popular with all classes; industrious, painstaking and honourable in business. He was for many years a member of the Legislative Council in which capacity he was most useful. Mr. Darley came to Ceylon about 1836. He joined the firm of Ackland, Boyd & Co., chiefly taking charge of Manchester Imports. He married a relative of Mr. Ackland. He left Acland, Boyd & Co. in 1845 or 1846 and went home. The firm of Acland, Boyd & Co. failed in 1847, when the whole of the estates in which they were concerned and some others were placed in Mr. Darley's hands by the proprietors in London, whereupon he returned to Ceylon and established himself as Darley & Co. In the following year Mr. Samuel Butler joined him and the firm became Darley, Butler & Co. The new firm did not retain the agency of all the estate properties; but on Mr. Butler's return from a trip home at that period, there came to be a large accession of business in Imports with more than a corresponding Export and Shipping trade. Mr. Darley and his family went home again at the end of 1855, and returned at the end of 1858—in which year his partner left Ceylon for England not to return until lately when he paid a short visit to the island. The success of the firm was substantial from first to last, culminating in large gains in cotton in the years of the American Civil War. Mr. Darley finally left Ceylon during 1862, joining Mr. Butler in London as Darley & Butler. He never retired from business, but died in harness at the close of the year 1869 at East Sheen."

Mr. Darley always maintained the highest reputation, in Colombo, as a merchant of the old, reli-

able and regular, but tolerant and dignified school. We well recall during our first year in Colombo, the handsome figure, highly intellectual countenance and cool attire—dressed all in white even to the short "white jacket" now only seen at dinner time—of Mr. Edward Darley as he moved about the Fort during business hours. He had previously taken a prominent part in the Colombo Chamber of Commerce and served for a time in the Legislative Council. He was in somewhat close communication with the late Sir R. F. Morgan and A. M. Ferguson, all three being selected as his Executors by Dr. Christopher Elliott; and we know what a very high opinion was entertained by our "senior" then and always, of the probity, keen sense of honour and great shrewdness of Mr. Darley. After some 26 years of good work in Ceylon, Mr. Darley—having made his fortune by investments in Tinnevelly cotton during the American War—finally retired to the old country, carrying with him the esteem and regard of all who knew him as essentially a useful Colonist, an honest merchant and a good man.

Agricultural Pests:

WITH METHODS OF PREVENTION.

BY MISS E. A. ORMEROD,

(LATE CONSULTING ENTOMOLOGIST TO THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND.)

VII.

APHIDES, SCALE INSECTS, PLANT-BUGS, &c.

This tribe includes the Corn Aphis *(A. granaria)* which infests the young stems of corn and the growing wheat-ears; the green dolphin, as it is called, of the peas; the collier of the beans; the hop aphis, which in 1882 caused a loss of more than a million and a half pounds sterling to this country; the turnip and cabbage aphides; the black cherry-tree aphis, and many other kinds too numerous to name at present, besides the white cottony aphis of the beech, and the genus known as pine aphides, some of which are cottony, and some have a hairy covering. With regard to what we know at present of means of prevention, our best course is, if we can, to nip the evil in the bud by destroying the very first aphides that appear. This plan is constantly carried out in field management with regard to the bean aphis. When the colliers, as they are called from their black colour, appear on the tops of the bean shoots, these infested shoots are cut off. If the shoots and colliers on them are destroyed, the attack, or at least a great deal of it, will be stopped; but if, instead of carrying off the fragments and destroying them, they are only thrown on the ground, the black aphides will walk, or fly, back again to the growing beans, and the labour will have been in great part lost.

This same plan is useful throughout the summer for all plants or trees, such as apple, plum, cherry, or others, in which aphides, or green fly, as they are often called, collect in great numbers on shoots, which may be cut off without hurting the plant. Thus, if the shoots and aphides on them are properly destroyed at once, we get rid of centres from which attack is constantly spreading to do present harm. Also we may thus lessen the amount of next year's attack. It is the autumn brood of males, and females which provide the eggs to start the attack of the following year; and, therefore, anything which lessens the production of broods is useful. The shoots, however, should always be destroyed at once, not merely thrown aside to wither gradually, whilst their infesting hordes gain wings to go home again. A healthy, yet not rank growth, is one great means of lessening the bad effects of aphis attack; as in the case of other insect attacks, the plant is thus supported through its troubles. But there is a further reason. It has been found that aphides come to maturity more rapidly when the plant growth is stunted, or the aphides themselves are so numerous, that it may be presumed the nature of the sap is different to that in the full flow of the healthy shoot, or the aphis is rather shortened of its food. Necessarily, maturity coming sooner, the successive broods are more rapidly produced, and the numbers greater.

Where we can tell with certainty that some species of aphis migrate at a special season, from one kind of plant or tree to another, we have a most serviceable method of prevention in our hands. It does not seem now to be open to doubt that a great part of the yearly attack of hop aphis, or "fly,', comes on the wing from sloe, damson, or plants of the plum tribe. This was long ago stated by German entomologists, and laid down by at least some of our hop-growers; and in 1884, after careful examination of specimens of aphides both from hop and plum, and reports from hop-growers (noted at length with figures in my Report for that year), I mentioned that there appeared to me to be reason to believe that the great attack, which usually occurs in the form of "fly" about the end of May, comes on the wing from damson and sole, as well as from the hop.

In 1887, the late Professor Riley (Entomologist of the Department of Agriculture of the United States), set the matter of migration from plum to hop beyond doubt by his observations, of which a part was read before our own British Association; he stated that:—"*Phorodon humuli* hybernates in the winter egg state, this egg being fastened to the twigs (generally the previous year's growth) of different varieties and species of *Prunus*, both wild and cultivated." From the winter egg Professor Riley found the female, the mother of the coming tribe, was hatched, the winged descendants of which female take flight to the plum. The existence of many generations on the hop, during summer, we are all well acquainted with; but during Professor Riley's stay in Europe, and more especially in England, he personally observed the point not previously worked out, of the autumn migration of the hop aphis, back from hop to plum, at the close of autumn. These observations, coming from such a high authority as Professor Riley, give thorough confirmation to the belief previously held as to migration,; but still, I do not think that in this country the whole of the attack comes on the wing from plum, damson, or sloe, because (amongst other reasons) we have found aphides—that is, wingless females and lice—on hop as early as the end of March and the beginning of April, long before the attack coming on the wing made its appearance.

The hop aphides may be distinguished from the plum aphis, and from others of the *Aphidinæ*, by the horns being hardly longer than the body, together with the lowest joint being toothed, or gibbous, and the tubercles on the forehead each having a strong tooth. The legs are short, and the honey-tubes long. Where there chance to be a large quantity of sloes, as, for instance, sloe hedges in the neighbourhood of hop-gardens, these at least might be got rid of without loss.

The number of remedies—such as solutions or mixtures of tobacco, paraffin, quassia, or other applications in the form of washings or syringings—are endless, and recipes are not given here, as these applications lie in the special province of the hop-grower. It may, however, be noted that sometimes washes fail in effect from the operator not being aware that in the case of many aphides the skin is covered with a kind of mealy coating, which throws off watery applications. Consequently, it often happens that unless the washing lodges amongst the aphides so as to kill them, or, again

the syringing is given with such force as to knock them from the plants, the insects are but little hurt. It is for this reason that soft-soap is so largely used, especially by hop-growers, for the washes: it is sticky, and thus adheres, in some degree, to the aphides,; also it may be made the vehicle of any other application with which it may be desired to poison the aphides; and, thirdly, it is a good fertiliser, which,as we have observed, is important in aphis attack.

The great thing, however, that we need to know in order to check aphis attack, is where and how each kind spends the winter. Meanwhile, our best hope as to prevention lies in allowing as few shelters as possible on trees, or in neglected bark (in fruit or tree attack), or at the roots of wild grasses round fields, for possible shelter of grain aphis, and, genenerally, being alive to the necessity of not letting everything drift without thought of the reason how, or why, things happen; and, for remedy, in use of washes which are known to be suitable for the purpose in hand.

The wooly aphis, or American blight, is chiefly to be found in neglected orchards. The aphides shelter themselves for the most part in crevices of the bark, or where a bough has been injured, or under young bark healing over wounds; but they may be found on the young shoots, and the leaves, and are distinguishable by the white cottony material which surrounds them. I have also found this kind of attack on the rootlets. The piercing of the aphis-sucker causes the growth just below the bark to become swollen and pulpy; then the cells divide, and the bark above splits, and thus openings are formed, which give the aphides new hiding holes; and the diseased growth from their punctures is continued, until large tumour-like masses are formed, and the trees are very seriously injured.

The best method of checking attack is to keep the bark of the apple trees in such a healthy state —by means of proper pruning, the clearing away of injured branches, and useless and cracked bark (and other measures)—that there may be as few cracks and crannies, and half-healed spots, as possible, consequently, as little as possible of the shelter in which this aphis delights. Also, when the white wool in any nook or on any soft shoot in summer time, shows the presence of the pest, the shoots should be at once cut off, and some remedy should be well brushed or rubbed into infested nooks.

The number of different kinds of applications advised are almost beyond counting, though the principle throughout is one. But anything will be of use which will stifle or poison the aphides, without hurting the bark of the tree; and probably common soft-soap, or soft-soap with a little snlphur dissolved in it, or paraffin or tobacco-juice added to it, and well rubbed or washed in, so that it may be sure to reach the pests in their sheltering nooks, will answer as well, or better, than most of the many suggested applications. Some of the applications said to succeed should be applied (if at all) with great caution, or they may do more harm than good by soaking into the bark. Tar is especially to be suspected, for it is apt to melt in the heat of the sun; and turpentine, resin, and fish-oil, mixed and put on warm, and, in fact, anything that will thus choke the bark, is an unsafe application.

For attack below ground, the best treatment seems to be the clearing away of infested roots and soil round them, and drenching the spot well with soft-soap washings or drainings from stables.

The fifth tribe of aphides (the *Rhyzobiinæ*) feed mostly on grass-roots, and are wingless; should they be found troublesome, the use of the cultivator, plenty of gaslime, and similar measures, would probably clear them out

It is exceedingly difficult to give any clear view of aphis life, or means of prevention, for few are known, excepting in cases where the plants are under cover, and where, therefore, fumigation can be brought to bear, But the principle throughout appears to be this:—Check attack by diminishing lurking-places, and also by pruning off and destroying infested shoots and parts of plants, or infested leaves (as with cabbage), as much as you can: and where you can bring washes to bear, use soft-soap as a foundation; but where the application may be run into the ground, and thus remain round the insects, ammoniacal water, or drainings from stables, lime-water, or other drenchings poisonous to insect-life, and that will not hurt the plant, have proved useful.

The "scale insects" are tho third section of the *Homoptera*. These insects do great harm by drawing away the sap by means of their suckers. There are many kinds, differing in various points of structure, as well as form; but in the case of the apple mussel scale which is sometimes very hurtful in orchards, this shell-like husk, which is in shape like a minute mussel-shell, adheres firmly to the bark during winter; and under it, but not attached to it, there lies the dead body of the female scale, and fifty or more eggs. In spring these hatch, and from them come small white flat insects, furnished with eyes, horns, six legs, and a sucker. These are very active at first; but presently each scale larva runs its sucker into some spot it can pierce, begins to feed, and ceases to move. A secretion of waxy material takes place on its back, beneath which the scale forms; and after various moults, and additions by secretion to the size of the scale, the change of the insect under it takes place to the perfect state. This, in the female, is to a shape like that of a globular flattened maggot, greenish in colour, without joint limbs, which lays eggs and dies. The males (I believe, in the present case, first observed not loog ago by Prof. Riley) have one pair of whitish wings, and no proboscis.

The best method of getting rid of these scales is to prune off infested boughs, where this can be done. Where it cannot, rubbing off the scales by means of cloths or brushes, after moistening the bark with water, or scraping them away with a knife, gets rid of many; and, generally, the same kind of remedies are useful as are applied for American blight, such as soft-soap, with some mixture of paraffin, kerosine, or other addition, which may stifle the scale insects which have been disturbed, and make the bark unsuitable for attack.

The order of plant bugs includes both plant and water insects, which may be known by a kind of leathery patch at the base of the front wings, "dis-similar" from the rest of the substance, whence the order takes its name of *Heteroptera*, or "dissimilar-winged." The long-legged insects known as water measures, which we see skimming about on the surface of ponds, and the water boatmen, which by the help of their long oar-like front legs sweep through the water like insect skiffs, are common examples of the water frequenters of this division.

The plant bugs sometimes do harm by sucking the juices of plants, especially by *Lygus solani*, which attacks potatoes; but they are, so far as I am aware, rarely injurious in this country to any serious extent. Some kinds, of a longer narrower shape, are to be found on wheat and barley. The wheat bug (*Miris tritici*) has also often been found on grass in marshes; the barley bug (*M. dolabratus*) is exceedingly common in barley, and on flowers of grass near.

Some of these various out-of-door bugs probably do good, by means of their carnivorous habits; and with regard to the wingless kind, which, to our misfortune, occasionally teaches us that feeding on animal juices, by means of a sucker, is a characteristic of this order, I think we need not enter on its prevention here.

The remaining order is that of the thrips, *Thysanoptera*. These are very small insects, which sometimes do much harm to corn. They are

nearly alike in shape in all their stages, but they are scarcely large enough to be seen by the naked eye.

The perfect insect of the corn thrips is blackish, but in the first state of larva or grub it is of a deep yellow; in the second it is of a paler yellow, with whitish wing-cases. These thrips are to be found from June onwards in the growing wheat ears, and sometimes in the sheathing leaves of the stem. They feed on the corn grain, by piercing into it with their sucker-like jaw apparatus, and thus draw away the juices and cause the grain to shrivel.

Another kind infests the potato, drawing away the juices in the same way as the corn thrips; as do also the aphides, scale insects, plant bugs, and some others, which we have just noticed, with their variously formed sucking apparatus. In the case of the potato thrips, dusting with dressings of lime and soot, or other mixtures, might do good; but for the corn thrips it seems impossible to find any application, as any of those used to destroy the thrips would hurt the corn. The chief means of prevention seems to lie in clearing stubble or in deep ploughing to get rid of thrips which may, be wintering at the roots of the removed crop, or in destroying wild grasses on which the eggs may be laid round the fields.

The knapsack sprayer is a very convenient form, and is noted here as being serviceable for distribution of washes and sprays for destruction of aphides, scale insects, &c.; as well as for the distribution of Paris-green, mentioned previously.

A CEYLON PLANTER IN GERMAN EAST AFRICA.

THE CLIMATE—FEVER—LEAF DISEASE.

I was tired of Ceylon, and got an offer of a good billet in German East Africa, and being told the climate and shikar were good, I jumped at it. The climate is rather warm in the plains, and delightful in the hills; until you stir up the soil, when it's fearfully feverish: pucca black-water fever. And as I came out as a planter, the results were inevitable. First thing I had to do was to drain out a lot of swamps, which was something like cleaning out cesspools. The planters are mostly Germans of sorts. One was a very decent chap, rest were an awful lot of bounders. A brother Englishman made me a trifle ashamed of my nationality. I landed at Tanga on the coast in October, 1893. Lovely harbour, Tanga, land-locked on 3½ sides, large enough to float ships of 4,000 tons at present. I marched up country: took me 2½ days in the very long marches of 20-30 miles a day.

First thing I did after planting up a ten-acre patch was to go down with fever for a fortnight. I got better, and the other Englishman on the tote had a row with the Javanese labour and left for the coast. I couldn't speak a word of the language, but quickly gathered they thirsted for the other man's blood. The plantation was only 90 acres planted, 50 more ready to plant, and at the end of the year we got it up to 350 planted. The "reserve" was a block of 275,000 acres. Lots of room for extension. All coffee, except two acres of wretched tea. Grew lots of native food, arrow-root and so on for estate consumption. Leaf disease first appeared some three months after I arrived, on the oldest coffee, about 15 months' old. Started on one or two trees, and I promptly spotted it and reported it to my boss and in fact the whole district. No one believed it at first and said I was drivelling. I burnt the affected trees at once, and sent specimens of the leaves to Kew and Berlin. Before we could get an answer, the pest had increased to such an extent that confirmation of my surmises was no longer needed. On making enquiries I find that the seed had been purchased in Colombo by the German Consul. It was reported that he bought the seed ignorant that it was to be used for planting. Ten per cent. at least was light. Of the balance only about 30-40 per cent. came up fairly strong plants. The best of these were planted out, with the above result.

The course of the disease ran curiously. It took a strip away from the lines right down a field. Then it worked back over a ridge through a break in the wind belt to another clearing, where there were two very large nurseries. These it played mischief with. These plants were put out and the whole estate got affected. I left before the full results could be seen, but I noticed the only unattacked portions were some line coffee and a little bit of a shade clearing. Nearly all the rest of the coffee was in the open, pucca Ceylon style, barring a few odd trees some 40 to 60 feet apart, that were only left because they were too big and expensive to cut down.—*Planting Opinion.*

COFFEE PLANTING IN NYASSALAND.

FROM AN INTERVIEW WITH MR. G. M. CRABBE.

Mlanji is fifty miles from Blantyre, and is situated on a plateau at an elevation which rises to 3,000 feet, though the Nyassaland Coffee Company's place is only from 1,500 to 1,800 feet high. This plateau is overlooked by Mlanji mountain, which rises to 10,000 feet. The country is undulating, like the Assam district, and it has a rainfall of about eighty. The temperature is cool and equable, but the place is particularly unhealthy from the middle of November to the end of February, which is the planting season. The pioneer of Mlanji is Mr. Henry Brown, who was formerly an Inspector in the Ceylon Police. When he left here, in 1890 or 1891, he went to Central Africa in connection with the work proceeding at the Lakes; but in a short time he took to coffee planting.

Mr. Crabbe said: "Well, when I left the Company's property they had 240 acres opened, and last year they opened another ten acres, making 250 acres opened, but another 250 is to be opened this year. The jungle which has to be cleared is very heavy, but the soil is by a long way the best soil that can be found there, and is very dark-red in colour. My place has been taken by Mr. Moggridge, who was formerly with Mr. Cotton, on Demeria, Passara. He has with him as assistant Mr. Robin, who also hails from Ceylon, having been a planter with Mr. Metcalfe in Punduloya. They came out to me a year ago last May. Robins has suffered very badly with fever. Five miles off our place was an estate belonging to Mr. Moir, who was formerly Manager of the African Lakes Company. He had about 180 acres opened in coffee. On the other side of us our nearest neighbour was Mr. Henry Brown, who had about 200 acres opened. He had some coffee in full bearing, and he had also a few tea-bushes, but they were not a good jat. Then about ten miles off us Mr. Bradshaw had about 180 acres. His was a very good place. His oldest coffee was about five years of age, and he got a crop of 30 tons last year. He has just left on a trip home, but he has certainly done the best of anybody there. Then, there is a small estate of 60 acres belonging to a Mr. Simpson, who, in addition to coffee, has gone in for a few native products. I think that is about all. Of course there are a good many plantations round about Blantyre; but with the exception of the Buchanans' property which is managed by Mr. Hunter, they are all small holdings. There are no factories, and all the pulpers are worked by hand with the exception of those at Mr. Moir's place. He has the only water-wheel in the country."

But the great thing they have to contend against, is the want of good seed. Of coures, the coffee is of the Arabian sort, but this want is greatly felt, and something will have to be done with regard to getting better seed. The Nyassaland Coffee Company *did* try to introduce Brazilian seed, but it didn't answer—it failed to germinate. All the seed we had was what we got locally. No coffee seed from India or Ceylon, you know, is allowed into the country on account of leaf disease, nor is tea seed allowed, though some sent by Mr. Carson from Ceylon managed to get in and it turned out a failure

It was Indian seed; but it got in as the Commissioner at that time was anxious it should be started. The coffee is planted under shade there."

"Then the administration seem to have done very little for the country up to date,—I mean as far as helping the planter goes. There is a great want of roads and transport facilities. We sent all produce to Chiromo on the river Zambesi. That is 70 miles away, and all the produce had to go down on niggers' heads as, though there was a river near us, and it led to Chiromo, it was not navigable. From Chiromo our produce went to Chinde; Beira, of course, being the port of export. There were two steamer lines which took our produce away, namely, the German East African line, which goes by way of Aden, and Rennie's line, which runs south round the Cape direct home, and which took the bulk of what we sent. The steamers of these lines call alternately once a fortnight. But Beira is just the same primitive place it always was. Not a single thing has been done in the way of making proper warehouses there, and what is exported and what is imported lies about on the shore till removed, and is exposed to all sorts of weather.

"Labour is plentiful. At least it is plentiful with the exception of the four wet months. That time the natives mostly employ in working their own gardens. A lot of the labour comes from Lake Nyassa, the people coming down a distance of over 200 miles. We sent Kanganies to recruit them, and when we got the labourers we paid them, in calico, three shillings a month, so they were cheap. The local labourers only got two shillings' worth of calico a month. We had no trouble either with advances or tundus. The language spoken is Mananga, it is very easy to learn, and all of us spoke it. The Angonis are the best labourers, and when we got them we had to get the Mananga language interpreted, but that was generally easily managed. The great want was native artisan.—"Local Times."

COFFEE-GROWING.

C. SKELTON.

My attention having been drawn to a paragraph adverting to a sample of coffee having been forwarded to the Department of Agriculture from the Clarence River district, as an ex-Ceylon coffee-planter, I felt interested in the fact that coffee could be produced in New South Wales, and called upon Mr. W. S. Campbell—of the Department—who was kind enough to show me the sample, which though only partly cured, being in the "parchment"— which, together with the silver skin having to be removed before it would be considered a marketable commodity—goes to prove that a fair quality of coffee can be grown in the Colony. The bean seems full, and of a tolerably good colour; so far as I can judge it would fetch from 65s. to 70s. per cwt. in the London market; were it cured in "plantation style" it might realize from 20 to 25 per cent. more. The question to be solved is, what yield per acre can be obtained from the plant in the latitude of the district where the sample was produced, for coffee is indubitably a tropical product and requires plenty of heat and moisture. What I am afraid will be found most detrimental to the success of coffee in this Colony are the frosts that even in the most northerly parts of the Colony are occasionally experienced. In Ceylon I once saw a field of coffee killed right out by one night's slight frost; it was at a very high altitude, about 5,000 feet, and it must have been of very rare occurrence, for the trees were ten or twelve years old when they were bitten. However, if that difficulty can be surmounted and labour obtained at a reasonable figure, the coffee would have to yield from 50 to 60 bushels of "cherry" coffee per acre —equal to about 6 cwt. per acre, or about ½ lb. of clean coffee per tree—to pay working expenses and leave a fair profit.

To the intending planter a few hints from one with seventeen years' experience at coffee-growing may not be amiss. Choose, if possible, land naturally drained, a gentle slope is preferable, so that surface water will not lie and sour the soil. Good friable soil, of course, is a desideratum, it need not necessarily be very deep, as coffee is a surface feeder. Avoid cold, wet clay sub-soil, as immediately the tap root reaches such a subsoil the tree will be observed to decline and ultimately die of what Ceylon planters used to technically term "wet feet"; the only cure for it is sub-soil draining, and that runs into a lot of money. The land obtained, the next thing is to make a nursery. Clear a piece, sufficient to raise plants for the area you intend to open, which, planted at 6 feet by 6 feet, runs to about 1,200 plants to the acre. Trench the ground and lay it out in beds, as you would a vegetable garden. Procure some coffee in the "cherry"—a bushel of cherry coffee will yield somewhere about 30,000 seeds, sufficient to plant about 25 acres—and pulp it by squeezing between the fingers, plant the seeds in the prepared beds 9 inches by 9 inches apart, with just a covering of earth over them. Water every morning and evening, unless it rains, and continue to do so until the plants are 3 or 4 inches above ground, and afterwards, should the weather be dry, give them a good watering every alternate evening or so. Meantime, while the plants in the nursery are coming on, your land is supposed to be in process of being cleared. Let the logs that have not been consumed by the fire remain on the ground; stumping also is unnecessary, as there is no ploughing to be done. Get some thousands of pegs cut, about 15 inches long; with these and a lining rope (an ordinary clothes line will answer), marked at every 6 feet with a piece of rag, or something let into the twist, proceed to mark off your ground in parallel lines 6 feet apart. Keep your lines as straight as possible by using three ranging rods, or wadd sticks, as they are usually called here. You will find the benefit of having your trees in straight lines afterwards in working the place; besides, nothing looks so bad as an irregularly lined field of coffee. It may sometimes be found necessary to cut or roll a log out of the way in order to get the peg in its proper place. When all the lining is done proceed to dig a hole 18 inches deep, by the same in width, at each peg, leaving all the soil dug out in a heap at the lower side of the hole. Scrape all the surface soil and ashes left from the burning off into the hole till it is heaped up, as it will sink considerably, then stick back the peg into the heap to mark the hole. After the holing and filling in is finished, seize the opportunity of the first wet weather to plant out your nursery plants, which, we will suppose, are now five or six months old, as it will take about that time to prepare the land for their reception. Lift each alternate plant, either by pulling them up and carrying them out to the field in bundles, or, if you have time and labour to spare, lifting each with a ball of earth at the root and taking them out to the field on trays of some sort. The latter way is the best when it can be done, but if you have a large field of 80 or 100 acres to plant up it takes a lot more labour to do it. Be sure not to put the plant in too deep, but only to the same depth that it stood in the nursery; it is a mistake that is often made to plant too deep, the leaves grow yellow and the plant seems strangled, and often takes a long time to recover. It is a good plan to put the plant in a little deeper than you intend to leave it, place the earth round the roots, then stand with a foot on each side, and give the plant a steady, gentle pull upwards—that brings all the roots straight. If you have favourable weather probably most of your plants will come on all right, but there are sure to be some failures, and filling up vacancies with the plants left in the nursery should be carried on at every opportunity, that is whenever you have wet weather. Planting completed, there is nothing much to be done except keeping the place clear of weeds, cutting any roads or drains that may be found necessary, and erecting some sort of temporary house accommodation for self and labourers, which should be of the cheapest, until such time as you can see

how things are going to "pan out." In eighteen or twenty months the plants will have grown sufficiently high to be topped—that is, cutting the top off the plant at 3 ft. 6 in. or 4 feet, according to soil and aspect, if at all exposed to wind the former height is the best. Topping has the effect of making the tree spread out laterally, covering the ground from the sun, thus tending to prevent the growth of weeds, besides facilitating the gathering of the crop. Trees grown in the "native" style—namely, allowed to grow to their full height, never bear more than half the crop they otherwise do, having so much useless old wood to sustain, besides the difficulty of gathering crop from branches 8 or 10 feet from the ground. In the third year the "maiden," or first crop—generally amounting to 2 or 3 cwt. per acre—may be expected, and preparations accordingly will have to be made for it by erecting the necessary pulping-house, store, and platforms for drying the coffee upon, purchase of machinery, &c. I may here state that in selecting a site for the works it is absolutely necessary to fix upon one to which it is possible to lead a stream of water, and if practicable, sufficient to drive a water-wheel, which will be found a very great convenience and saving of labour; in fact, if any considerable area is to be put under coffee it will be found almost impossible to get through the work without one; in any case water is indispensable for pulping and washing the crop. To give directions for the erection of the necessary works, to be of any practical use, is scarcely within the scope of an article of this sort. Illustrative diagrams would have to be given and the most minute details entered into to make it intelligible to the ordinary understanding. Messrs. John Walker & Co., Bogambra Mills, Kandy, Ceylon, supply all the machinery necessary on coffee plantations, and if applied to, I have no doubt will be glad to forward price lists. A Walker's disc pulper, sufficient for the crop to be obtained off 25 or 30 acres of coffee, can be purchased for about £15; laid down in this Colony for about £17 10s. In Ceylon and Southern India the usual estimate for bringing coffee into bearing was £10 per acre; that embraces felling, clearing, planting, and general maintenance till the coffee begins to yield returns, namely, in the third year after planting. As previously stated the first or "maiden" crop is usually from 2 to 3 cwt. per acre; it goes on increasing up to the sixth year, when the tree is supposed to be in full bearing, when with good soil and favourable seasons it may yield 10, 12, or even 15 cwt. per acre. Under these circumstances it is not difficult to see how paying a speculation coffee-growing is, with annual working expenses at £8 or £10 per acre, and London ruling prices for "plantation" coffee at 100s., and sometimes over that, per cwt. Unfortunately, results do not always come up to expectations; the coffee planter, like the farmer, has many difficulties to contend with, white bug and black bug, too much wet or too much dry weather, scarcity of labour at critical times when he most requires it, and, sometimes, that which is worst of all, scarcity of money. However, taking it all in all, a little discomfort and hard work is easily borne when there is a prospect of making a competency, of which I do not think there can be much doubt should judgment and care be exercised. It is as easy to lose money at coffee as it is at almost anything else with a reckless hand at the helm.—*Agricultural Gazette.*

THE DIMENSIONS OF TREES.

In our last issue we called attention to some trees, of extraordinary dimensions, recorded in Kerner and Oliver's *Natural History of Plants:* we now add some notes of measurements of large trees of Indian species which may be of interest.

Cedrus Deodara.—A section of a Deodar tree from the Jaunsar forest in the Forest School museum measures 27 feet in girth and shows 655 annual rings.

Cupressus torulosa.—Brandis' Forest flora mentions a cyprus tree measured by Dr. Steward which was 27 feet in girth near the ground.

Tectona grandis.—Teak trees of enormous size are not infrequent in Upper Burmah. A felled log in the Yamethin forest measured by S. Carr was 64 feet long and 13 feet 9 inches in mean girth; it was perfectly sound, and, when found, was in process of being split up to build a Buddhist monastery. In the Myittha—Panlaung forest there are two immense teak trees standing side by side, the largest of which was found by H. Calthrop to be 20 feet in girth at 6 feet from the ground with a height 60 ft. to the first branch; and at Alaungdaw-Kathaba in the Chindwin a tree measured by C. E. Murid girthed 17 feet 4 inches at 5 feet from the ground.

Bombax Malabaricum.—We have a photograph of a tree said to be 87½ feet in girth one foot from the ground, but it is believed that the measurement was taken along the contour of the buttresses.

Santalum album.—As a record measurement of a tree of the smaller classes may be mentioned a sandal tree felled by A. E. Lawrie in Coorg which measured 5 feet 6 inches at 5 feet from the ground.—*Indian Forester.*

THE PROXIMATE CONSTITUENTS OF TEA.

	Assam.	Ceylon.	Java.	China.	Japan.	Natal.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Non-Nitrogenous Bodies:—						
Organic acids. Gallic and oxalic acids, &c.	1	·65	·50	·25	·25	·50
Organic acids. Tannic acid	11 to 18	15	14	12 to 20	12 to 16	10 to 14
Organic acids. Boheic (Assamic) acid	1·50 to 2·5	1·75	1·50	1	1·25	1·25
Carbo-hydrates. Cellulose	18	20	22	25	22 to 26·5	24
Carbo-hydrates. Gum and dextrine	2·75	2·5	3	3·25	3·25	2·75
Carbo-hydrates. Glucose	trace	—	trace	—	—	trace
Mucilage, pectin, &c.	9·75	5·5	6·5	7·2	6·7	7
Resins, &c.	2	3·75	3·25	3·25	3·5	2·75
Fixed Oil and Theol (volatile essential oil)	·7 to ·9	·6	·55	·4 to ·5	·5	·6
Gums and Waxes	3·75	4·25	4	4·25	4·50	4·2
Nitrogenous Bodies:—						
Chlorophyll	1·8 to 3	1·5 to 2·5	1·25 to 2	1 to 2·2	1·8 to 2	1 to 2
Amides	traces	traces	traces	traces	traces	traces
Theine	3 to 6	2 to 4·5	3	1·5 to 2·25	1 to 2 5	3 7
Other Alkaloids	traces	traces	traces	traces	traces	traces
Albuminoids	20	22	20	21·5	20	21·7
Inorganic Bodies:—						
Mineral Substances	4·5	5·6	5·5	6·7	6·5	5·75
Moisture	6 to 8	8·5 to 10	6 to 12	8 to 16	12	8 to 11

—*Journal of the Society of Arts.*

TRADE OF INDIA: 1896-97.

As we anticipated, a recent post has brought us from the Government of India, a copy of the "Accounts relating to the Trade and Navigation of British India for the month of March 1897, and for the Twelve Months, 1st April 1896 to 31st March 1897, compared with the corresponding period of the years 1894-95 and 1895-96." This is a bulky, but handy-sized statistical return of 118 pages giving full details of all the Import and Export Trade of India for the year ending with March last; and yet the press and merchants of Colombo have not yet (at end of May) got the local Customs Accounts for the year ending 31st December last. We quote the grand totals of the Trade of India :—

FOREIGN TRADE.

	1894-95. R	1895-96. R	1896-97. R
IMPORTS.—Total Merchandise.. ..	735,289,926	729,367,533	762,158,352
Total Treasure..	95,812,073	133,679,854	130,845,635
Grand Total of Imports ..	831,101,999	863,047,387	893,003,987
EXPORTS. Foreign Goods ..	50,574,144	47,175,159	40,336,372
Indian Produce and Manufacture ..	1,037,575,846	1,095,456,241	998,801,824
Total Treasure...	82,260,717	42,598,105	49,374,955
Grand Total for Exports ..	1,171,398,499	1,185,945,489	1,089,211,139
Grand Amount of Import Duty collected, including Salt ..	54,368,245	65,743,137	61,390,392
Ditto, Export Duty Collected ..	9,034,881	9,292,242	7,525,600

We shall discuss some of the details very soon.

DESICCATING MILLS.

A Marawila correspondent writes :—

The Superintendent and Engineer of the Veyangoda Desiccating Mills were here some time ago prospecting for a site it was said to start Desiccating Mills. They fixed on a spot at Kudaweva near the 42nd mile on the old road bordering the canal. The more mills the merrier for estate proprietors.

CURIOUS PRECIOUS STONES.

A Bangalore Correspondent sends us the following interesting communication :—

"In your issue of the 20th April para 3, particulars regarding a star sapphire from Ceylon are giving at some length. Several royal personages, whose names are mentioned have seen this gem—which is now on view in London—between two lighted candles. The stone is said to be worth several thousands of pounds. I have got a star sapphire, set in a large gold ring, and I wish it were worth even a few hundreds of pounds. Nevertheless if the stone is held between two lighted candles, it likewise shows 3 separate stars with rays; but in any other light only one star is visible; but embellished with 6 rays. If the stone is held some distance from the eyes with the sun shining upon it, the star will appear to advantage, in fact much more distinct than if looked at in any room, but between two lighted candles in the day-time the stars are brought prominently out even when held quite close to the eyes. Such being the case, the stone is certainly an uncommon one. Evidently the London jeweller knew what he was about when exhibiting the gem between two lights. Many years ago the great jewellers, P. Orr. and Sons, of Madras, advertised in the Madras papers a star sapphire for sale. The advertisement was intended for Rajahs and capitalists, and it must have been a beautiful gem or it would not have been so advertised. I do not know who purchased the stone, but after reading your paper regarding the one now in London, it struck me that it might be the same stone, and that the exhibiting of it between two lighted candles with the result shown was in all probability a new discovery.

" I have probably the best cat's-eye stone in Southern India. It is set in a large gold ring, and it has been in my possession for a quarter of a century. I purchased it from Agurchand, the rich Madras Sowcar who died a few years ago. It is nearly as large as the human eye, and in some lights—say in a small room with windows all around it, no less than 6 opalescent rays are visible. In a room with fewer windows, 3 or 4 rays are visible. A few years ago particulars of a large cat's-eye stone were given, that was on show at the Melbourne Exhibition. I read accounts of it in the Madras papers. It was the property of a Ceylon merchant, who wanted £3,000 for it, and it was stated that the Governor of the colony, whose name was mentioned, had offered £2,000, but his offer was refused. It was also said that it was the only stone in the world that had 4 or 5 opalescent rays in it, but this statement was untrue. My cat's-eye stone is evidence to the contrary. Dealers in these gems say that the more opalescent rays there are in a specimen, the more luminous will be the single ray observable in the stone when examined with the sun shining upon it. This is no doubt correct. For my stone is worth looking at when the sun is shining straight down upon it,——when the single ray in the centre of the stone appears alive with light, and is something to be remembered. Many years ago I sent it to London with a gentleman who is now in this country and who was going home on six months' leave. I did this at the suggestion of Surgeon-General Furnell and Surgeon-Major Luke Hackett, who were much interested in precious stones and who were anxious to know what the London jewellers would value it at, and in two of the largest shops in that great city the same valuation was given, viz., £100, and good cat's-eye stones have risen in value since. I examined the stone yesterday, between two lighted candles, simply out of curiosity, when two well-defined and luminous opalescent rays appeared. The distance between each ray was about one quarter of an inch, and the sight was worth seeing. Of course at any time of the day and in any room with daylight in it the stone is worth looking at. I am convinced that this gem was once worn in the earring of an idol in some temple, as there is a gold pin running through the bottom of it, and this drilling of the stone would not have been done for any other purpose than the wearing of it in an earring, but the gold pin is not visible except on close inspection; and this reminds me that the Orloff diamond served as the eye of an

idol in a Trichinopoly temple, and was stolen by a French soldier who sold it to the captain of a ship for 50 rupees. It then passed into the hands of a German Jew, who paid, I think, £4,000 for it, but the Jew knew what he was about, as he sold the stone to the Empress Catherine of Russia for £80,000, an annuity of £8,000, and a title of nobility. I could have sold my cat's-eye ring many times had I wanted to part with it, for it has been seen by many officers, both Civil and Military, of high rank, and it was always very much admired. It would make a handsome brooch stone, if surrounded by diamonds, rubies, or emeralds, and would then grace the neck of the fairest lady. I have had in my possession many years a very good fire opal. It is set in a massive gold ring, nearly all the colours of the rainbow are visible in this stone. A large spot of red is often seen in it of such brightness that to look at it is like looking into a furnace, the colour is so vivid. This gem has also been much admired by many people, and a District Sessions Judge some years ago was anxious to become its possessor. I applied the two lighted candle test to this stone also, and the different colours that came out by simply changing the position of the stone by a slight turn of the fingers was something marvellous, and brought back to memory what I had read of the fire opal the size of a hazel nut, that Nonnius, the Roman Senator, had in his possession. It was valued at 50,000 sesterces, and rather than part with his gem to the Emperor, he suffered exile, and took his beautiful opal with him. A rich lady, the wife of a gallant officer of Cavalry, who was in this station last year, had in her possession a very large fire opal—something really worth looking at, and worth having also ; for a Delhi jeweller, who was at this station for a short time, offered 15,000 rupees for it, but the offer was not accepted. I have a small cat's eye stone set in a gold ring that will give two opalescent rays. The little gem is worth looking at, and is of nearly the same colour as one belonging to a gallant colonel, now in Madras which he wears set in a scarf pin surrounded with small diamonds. I saw this stone a few years ago, and was told by the Colonel that he got it direct from England and gave £75 for it. Alexandrite is not a very common stone. I have got a well cut one that was brought from Ceylon. It is a dark green stone, but will turn of a red colour from reflected light ; the light from a lucifer match is sufficient for the purpose. The stone was named Alexandrite after Alexandra the Princess of Wales, and is only a recent discovery. I saw a very large uncut one some years ago in Madras. It was shown me by Streeter's agent, who was spending his X'mas holidays that year with a friend of mine a few years ago. I read in the English papers that the Maharajah Dhuleep Singh had purchased in London some handsome opals as a present to his mother, as there were no opals in India. I could have told Dhuleep Singh whom I had seen in this country when he was a boy, that he was under a wrong impression, for opals are found in India, for I picked up a very good one in the Nirmul Jungle in Feb. 1858, which I gave to Capt. Robinson who commanded my company as something that would remind him in after years of the long march the regiment had during the Mutiny from Madras to Calpee. During the Mutiny I purchased a few stones of Banda, Kirwee, Saugor, and other places, but of no particular value, except a few rubies at Saugor for two officers of the regiment. Some beautiful moss agates, onyx, sardonyx, carbuncles, topazes and other stones I came across. Some of them are real curios. I have in my possession a large piece of stone so ugly that no one would ever think of picking it up. Yet, nevertheless, it is really worth having, as a half score of brooch stones and a score of finger ring stones could be cut from it ; the polish it takes, and the beautiful colours in it then come grandly out. It is probably a blood stone, but the blood stones seen in rings are nothing in comparison either in richness or colour to the ugly looking treasure I have. I have all sorts of corundum, but the greatest curio is a ruby corundum 4 inches long, hexagonal, or six-sided (the true formation) and weighing over two pounds. This is no doubt the largest ruby, not a crystal ever found, and it will take a fairly good polish of a cloudy ruby colour. If it was a pure crystal it would be worth millions of pounds. The weight of this stone would not be credited by anyone not knowing the relative weight of the different kinds of precious stones. Probably the best judge of precious stones in England has stated that he has seen £1,000 paid for a good cat's-eye ring stone. Some jewels were sold lately at the Mysore Palace and 4 cat's-eye stones were sold for 8,000 rupees by a jeweller from Bombay. An engineer officer who saw the stones spoke anything but in praise of them at the trial of Mr. Jacobs, at Secunderabad (the great diamond case). I read in the Madras papers that he had two cat's-eye rings on his fingers when in court which were much admired by those present. One of these stones was valued at 8,000 rupees. Nearly all large diamonds have eventful histories. The Kohinoor (mountain of light) now worn by Her Most Gracious Majesty the Queen-Empress has a wonderful history, so has the Pitt or Regent diamond. Pope in his Man of Ross, I think, would lead his readers to believe that it was stolen by Mr. Pitt when Governor of Madras :

> " Asleep and naked as the Indian lay
> An honest factor stole the gem away."

Mr. Pitt wrote at length to prove the accusation false, stating that he had purchased the stone from one Helmachund, and mentioning the number of pagodas he paid for it ; the purchase nevertheless was a profitable one for he sold the stone to the Regent Duke of Orleans for £120,000, and it was worn afterwards by the Emperor Napoleon in the pommel of his sword. The De Farcy diamond has probably the most wonderful history, as it was the property of King Charles of Sweden, and he had it with him at the battle of Pultowa, where he was killed. Afterwards John De Barley, Count DeFarcy, became its possessor, and he sent it as a present to the king, but the mounted servant to whom it was entrusted was attacked by robbers and killed ; the diamond, however, was recovered, the faithful servant having swallowed it. The largest diamond in the world belongs to the Rajah of Borneo ; it is uncut and in shape like a pear. There have been large sums offered for this stone, especially by the Dutch, but the Rajah will not part with it, as it is a treasure mine to him. Water is put into a small hole at the top of the stone and the people of Borneo believe that the touching of this water with the finger and putting a drop to the forehead will cure the worst diseases. In this belief all those who can afford it try this water cure. A very rich man could, if he wished buy a small basketful of diamonds from 4 to 8 carats weight each but he could not buy a basketful of rubies or

good cat's-eyes; for these stones, of good quality, are not procurable in the market, and it is almost an impossibility to buy a large emerald, as a large one free from flaws is rarely met with. The largest ruby in the world is not much larger than the egg of a pigeon."

Our correspondent's letter is apparently not written in a purely literary spirit, for at the end he asks us to add that lovers of gems and curios who may wish to purchase the stones described by him are invited to address him on the subject. The communication, notwithstanding that it is a sort of catalogue of his wares, is, however, interesting, so we are not unwilling to do what he requests, and forward him any letters that may be addressed to him at our office under the initial "T." We know more of our correspondent than his name and address.—*M. Times*, April 29.

CEYLON TEA IN THE STATES.

Mr. Kenyon Parsons writing to our contemporary says:—

"Since Mr. McKenzie has taken up the work of pushing teas here there has been a great desire on the part of the trade to pay attention to Ceylon Teas. This is owing I am convinced to the way Mr. McKenzie has advertised the tea in the trade papers, and I may say also in the magazines and periodicals. The expenditure of money in this direction is just beginning to make itself felt, and if it were stopped now, it would be equivalent to throwing seven-eights of the money spent in advertising away. The value of advertising is in proportion to the length of time you advertise. Every year will show a greater return over the previous year, and to stop now, would be like, after you have cleared and planted up an estate to withdraw your labor, and let the tea plants grow up as best they could, and though I have not had the pleasure of meeting Mr. McKenzie, I think the thanks of all interested in Ceylon tea are due him. To my mind the best way to push tea in this market is to advertise in the trade papers and a few magazines as Mr. McKenzie is doing now. You will find that the trade will take hold of the tea. It is the 'trade' you wish to get."

This most fully confirms the view we have held all along as to the greater value of advertising—rather than of subsidising.

AMERICAN NATIONAL BOARD OF TEA EXPERTS.

The American Government is determined to secure the purity of the tea imported into the States, and having passed a law on the subject, it now follows this up in the following practical way:—

The Secretary of the Treasury has appointed A. P. Upham and E. A. Schoyer, of Chicago; Herbert G. Woodworth, of Boston; T. A. Phelan and W. P. Roome, of New York; Andrew P. Irwin, of Philadelphia, and Robert B. Bain, of San Francisco, as a Board of Tea Experts, under the act of March 2, 1897, to prevent the import of impure and unwholesome tea into the United States. The Board has held several meetings at the Appraiser's stores, and is gathering information and seeking aid in order to fix a satisfactory standard. A report has been submitted to the Secretary of the Treasury, which states that the Board has selected such standards as, in its opinion, will represent the intention of the bill regarding purity, quality and fitness for consumption. The reports adds:—

The Board recommends, first, that the comparison of standards with teas delivered shall be made not only with regard to flavor, but particularly with regard to the appearance of the leaf after infusion. In color of infused leaf and in freedom from admixture with black and decayed leaf all teas should be equal to the standards, but any consideration of the make or so-called style of the dry leaf should be omitted. The leaf of the infusion must equal the standard in freedom from scum, gritty substance and leaf made up of dust and congee (*i.e.*, rice paste) The Board further recommends that your Department issue instructions that all teas shall be labeled with their proper trade names, so as to avoid palpable fraud in the use of false labels. The importance of this point has been pressed upon it by the trade, and it cannot too strongly emphasize it, particularly referring to green teas, of which the Pingsuey kinds have been heretofore labeled Moyune, the former being an inferior and the latter a superior tea. The Board therefore respectfully urges upon you as of supreme importance that the examiners should be not only thoroughly honest and trustworthy, but also experts in tea. That the present incumbents at New York and Chicago meet these requirements the Board has no question, but as the examiner at San Francisco is not an expert in teas, but a chemist having insufficient knowledge of the article, it is absolutely necessary that a person possessing the proper qualifications should be appointed at that port

AN AERMOTOR FOR COLOMBO.

The first of the variety of wind mills known as Aermotors in Colombo has just been erected at Devon House by Messrs. W. H. Davies & Co. It is a wheel of 8 feet diameter, made of galvanized steel and mounted upon a galvanised steel tower 60 feet high. In an extremely light breeze it was pumping 200 gallons of water per hour to a height of 30 feet, and as this was too great a quantity for the requirements of the bungalow the length of the stroke of the pump has been reduced by one-half. In Colombo we have an average diurnal movement of air varying from 150 to nearly 300 miles according to the season of the year. This means from 10 to 20 hours' full work. The mills are so regulated that they go out of the wind when it exceeds 15 miles per hour and no danger therefore exists of their being blown over. The towers being of steel, galvanized after being made, are practically indestructible, and their gracefulness and airiness greatly beautify the landscape. This is the first, as we have said, to be erected in Colombo; but Messrs. Davies have another of the same make in Chilaw, presently being erected for the purpose of pumping water from a river on to some arid lands, and thus converting them into paddy fields. The Devon House one supplies water for domestic and bathing purposes in the house, as also to the stable and coach-house, duck-pond, fountain, and for sprinkling the lawn. In America there are small town water supplies consisting of windmills mounted on large tanks and capable of pumping and storing the water for 800 to 1,000 inhabitants. This would be of great benefit in many towns in Ceylon:—Negombo, for instance. In America also these "Aermotors" are erected at most railway stations.

ARTIFICIAL MANURES.

Brazil.—With a view to preventing the numerous falsifications noted of late in chemical manures, imported from abroad or prepared in Brazil, the Farmers' Association of the State of St. Paul have just petitioned the Congress of this State to pass a law for stopping the sale of these fraudulent makes.—*Belgian Consul at Saint Paul.*

How a Planter Terrifies a Crimp!

"Now Thunder and turf!" Pope Gregory said
And his hair raised his triple crown right off his head—
"Now Thunder and turf! and out and alas!
A horrible thing has come to pass!
What!—cut off the head of a reverend Prior.
And say he was *only* (!!!) a bare-footed Friar!—
'What Baron or Squire,
Or Knight of the shire
Is half so good as a holy Friar?
O turpissime!
Vir nequissime!
Sceleratissime!—quissime!—issime!
Never, I trow, have the *Servi servorum*
Had before 'em
Such a breach of decorum,
Such a gross violation of *morum bonorum*,
And won't have again *sæcula sæculorum!*—
Come hither to me,
My Cardinals three,
My Bishops in *partibus*,
Masters in *Artibus*
Hither to me, A. B. and D.D.
Doctors and Proctors of every degree!
Go fetch me a book!—go fetch me a bell
As big as a dustman's!—and a candle as well—
I'll send him—*where* good manners won't let me tell!'

TEA IN AMERICA.

NEW YORK, April 7th.

Elsewhere we print from a copy of the officia report the recommendations of the Board of Experts to the Secretary of the Treasury, regarding tea standards to foreign importations. They practically exclude two thirds of the Pingsuey teas and many low grade Oolongs. A protest has been filed with Secretary Gage by Mourilyan, Heimann & Co., of Japan, through their local office as follows:—

Dear Sir,—In the matter of the recent act "to prevent the importation of impure and unwholesome teas," we beg to protest against the adoption by the Department of the standards recently selected for Japan teas, for the following reasons:

First.—That all Japan teas, being prepared from one and the same leaf, it is not necessary to establish more than one standard.

Second—That the three standards, as selected by the Commissioners, represent three different qualities of this one leaf, the sundried tea being better in cup quality than the pan-fired tea, the basket-fired tea still better than the sundried. The effect of this confusion will be detrimental to the Western trade, where sundried teas are used and will favor New York, where the trade is almost entirely pan-fired tea.

Third.—That the standard of pan-fired tea as selected, is apparently early second crop tea mixed with first crop leaf, the result being that in a number of successive drawings the cup quality varies from 1 to 3 cents per pound.

Fourth.—As in the preparation of Japan teas the same tea is frequently subjected to both the pan-fired and the basket-fired process it will be manifestly impossible for the examiner to determine by which standard such tea should be tested.

We have for many years been importers of Japan teas, and under the old law never had a tea rejected at any port in the United States; consequently, we have no interest in the "importation of impure and unwholesome tea," and we only ask that one fair and proper standard be selected in accordance with the spirit and letter of the law.

The present standards, although selected, no doubt, with care on the part of the Commission, are calculated to seriously disorganize the trade in Japan tea, and will greatly curtail the amount of business that could legitimately be done under a proper standard. The market is steady on low-priced teas, particularly Pingsuey. Several lines have been sold the past week, but the aggregate of transactions has been light. The distributive demand is slow.—*American Grocer.*

BRITISH NORTH BORNEO: TRADE RETURN 1895-6.

The total Exports amount to $2,420,234·39 against $1,962,350·19 for 1895 or an increase of $457,884·20. Out of 38 headings 28 show an increase. Tobacco showing the largest, and accounting for one-third of the total increase on exports for the year, 8,700 bales were shipped in 1895, $10,448 in 1896, and it is estimated that the 1896 crop shipped in 1897 will amount to 14,500 bales.

Rattans, cutch, timber, guttah, coffee, dried fish, copra, live stock and gambier come next; and the increase of export in each of the above over 1895, is,

Tobacco	.. $311,008	or about	.. 32	per cent
Coffee	.. " 11,295	"	.. 73	"
Gambier	.. " 2,609	"	..270	"
Copra	.. " 3,403	"	.. 54	"
Cutch	.. " 28 668	"	.. 25	"
Timber	.. " 20,620	"	.. 26	"
Dried fish	.. " 9,694	"	..136	"
Rattan	.. " 83,852	"	.. 87	"
Guttah	.. " 11,456	"	.. 27	"

The exports have fallen of principally in camphor, damar, sago and sundries, but the decrease in damar is partly accounted for by a decrease of the import from outlying islands more especially Palawan. The Gross volume of trade has risen from $3,626,256·83 in 1895 to $4,302,423·03 in 1896 or a gross increase of $676,166·20 which is rather more than 18 per cent.—*British North Borneo Herald*, April 16.

MOLLENDO RUBBER IN LIVERPOOL.

The grade of crude rubber indicated here derives its name from the port of Mollendo, on the Peruvian coast, whence it is brought by rail from Lake Titicaca, its original source being the section of Bolivia which lies above navigable portions of the river Beni and the streams running parallel to it. It is only a year or two since Mollendo rubber began to make its appearance in the Liverpool market, yet in their latest annual review Messrs. Kramrisch & Co. say:—"An important feature during 1896 was the increase in the imports of Mollendo sheets and biscuits. The inquiry was only moderate during the first few months, in keeping with the supply, which was then only small. It was during the latter half of the year that the imports increased considerably. The lots brought to market were quickly bought up, so that the increase in the supply did not depress the value of this rubber; on the contrary, the margin between Mollendo and the ordinary soft-brown-cure fine decreased; and we see as much as 3s 5½d paid for Mollendo fine in July, at a time when the same price was quoted for soft-brown-cure fine, and 3s 4¾d to 3s 5¼d in November, when the value of soft-brown-cure was barely ¾d more. About 1,500 bales have changed hands during the past six months, 3s 2¾d being the lowest and 3s 5½d the highest prices realized." A recent report by the British consul at La Paz, Mr. Alfred St. John, states that rubber trees are abundant throughout the Bolivian forests, but every port of the republic is difficult of access. La Paz is reached by four days travel from Mollendo, by rail and lake steamer, after which twenty-two more are required to reach the Beni rubber region. The amount of rubber exported via Mollendo in 1894 is stated at 85,000 pounds.—*India Rubber World*, April 10.

NATAL BARROWGREEN TEA.

It will be remembered that, about three months ago, a successful Ceylon tea-grower (Mr. John Fraser) visited Natal, and inspected all our tea estates. He readily recognised that Natal was favourably situated for the growth of tea, and suggested points for improvement in manufacture. He little thought at the time that he would himself be connected with the industry in this Colony, but, just before he left, after arranging to send a practical man from Ceylon, he was prevailed upon to promise to return himself and take over the management of the Barrow Green Estate. He returned from Ceylon a few weeks ago, and at once set to work in putting that estate in order, and manufacturing a tea that he felt would recommend itself. Desirous of proving the quality of the tea by the first public test, he determined to exhibit at the Johannesburg Agricultural Show, and he did this with tea that was only picked at the beginning of March, a fortnight or so before the date of the show. Despite the "newness" of the tea, he has had the satisfaction of returning from the show with three first prizes and also a gold medal for the best exhibit of tea, and the samples he took were readily purchased at good prices. If so much can be accomplished in so short a time, it is evident the experience and knowledge of men like Mr. Fraser should have valuable effect on the tea industry of this Colony. Calling upon us the other day, he pointedly asked how it was that Natal, with two years' start of Ceylon, had not yet turned out a million pounds' weight of tea per annum, while last year Ceylon's output was 100,000,000 lb. and this year it would be 115,000,000 lb. Answers to that question might elicit useful information. Mr. Fraser brought us samples of the prize-winning teas, which we put to practical test by trial on the domestic table. With the exception of the "newness" referred to, and which, of course, was to be expected, the teas were exceedingly good. The Pekoe Souchong is the one of common demand, and properly aged (as Mr. Fraser says all the Company's teas will be before being permitted to leave the estate), it is sure to be in much favour. The Orange Pekoe and Golden Pekoe are, of course, higher grade teas, and they are decidedly real good teas to drink. Of nice colour, there is body and flavour in them without harshness. While Natal tea as a whole has undoubtedly improved, there is still room for progress, and the time is not far distant when the yield and sale should be considerably increased. Competition will certainly do good.—*Natal Mercury*, April 9.

CATTLE PLAGUE (RINDERPEST).

Rinderpest, commonly referred to as "murrain" (a term which is unfortunately sometimes confused with foot-and-mouth disease) has been one of the chief subjects with which agricultural and veterinary papers have been occupied, since it began to be the cause of so much devastation in South Africa, where the loss of cattle by this epizootic has been something appalling. Here, in Ceylon, cattle plague may be said—like the poor—to be always with us, and it is a question whether the aggregate of our annual losses from this plague (say for 25 years) does not exceed the loss caused by a visitation such as has occurred at the Cape. It is well-known that the Government of Cape Colony engaged the services of Dr. Koch, the eminent Berlin scientist, to investigate the cause of rinderpest and, if possible, discover a means of cure, and later on we were informed by telegram from Reuter that Dr. Koch—who is now in India—had discovered a preventative against the plague.

Hitherto, the only effectual method of dealing with rinderpest has been by slaughtering both the infected animals and those which have been in contact with them, combining with this the strictest quarantine regulations. In this way rinderpest was once and for all stamped out of Britain, and in those districts in which the same treatment was adopted at the Cape, the losses were considerably less. For instance, in the district of Mafeking where cattle were not shot down, there were no less than 80,000 deaths from the plague, while in Barkly West, where 12,000 diseased animals and animals in contact with them had been shot and the disease so prevented from spreading, only 600 died of plague, making a total loss of 12,600 head of stock. It is not every country, however, that can adopt such drastic but effectual measures; but where they can be enforced, as in India, very energetic action in enforcing quarantine rules is necessary to localize and check the spread of cattle plague. It has been truly said that to attempt anything like medical treatment is only "playing with fire."

The local *Agricultural Magazine* included in our monthly *T. A.*—has been reprinting the interesting reports made by Dr. Koch on his investigations at the Cape, and those who have read these reports will have some idea of the delicate nature of the work which the great scientist has had to face. The details certainly afford most interesting reading. We would, therefore, wish to refer, not to the various trials which had to be carried out before the successful attempts to prevent liability to the infection of rinderpest were arrived at, but to the successful results themselves. The following extracts from Dr. Koch's fourth and most important Report will speak for themselves:—

"In my last report I was already in a position to inform you that blood-serum of cattle which have recovered from Rinderpest had a certain immunising

effect upon healthy stock when inoculated with it. Its protective properties however are not very great, for 100 ccm. of such serum are required to protect an animal against an inoculation with a small dose of Rinderpest-blood. This immunity is in its nature merely a "passive" one and will only last during a short period. For protective inoculation on a large scale such serum is not applicable, but I succeeded in immunising within a fortnight several animals by means of a mixture of serum and virulent Rinderpest-blood to such a degree that they were enabled to withstand an injection of 20 ccm. Rinderpest-blood, a ten thousandth part of which is a fatal dose. From this fact I judge that the immunity of these animals is of a much higher degree and I believe it is an active immunity, equal to that of a beast which has contracted Rinderpest and recovered. It is particularly important to know that only 20 ccm. of such serum are required to immunise one animal, and therefore one litre (nearly 1¾ imperial pint) suffices for fifty head of cattle. My further investigations concerning this *modus operandi* will aim at finding

If this immunity is obtainable in a still shorter period;

If a still smaller dose of serum will suffice and if it may be attained with but one injection.

"A second and equally important fact is that one is able to render immune healthy cattle with the bile of such that have succumbed to Rinderpest. In this case only one hypodermatic injection of 10 ccm. is sufficient. This immunity sets in on the 10th day at latest and is of such an extent that even fours weeks afterwards 40 ccm. of Rinderpest-blood could be injected without any injurious result. I therefore conclude that the immunity produced in such manner is of an 'active' nature. The local result of an injection is merely a hard, somewhat painful swelling of the size of a man's fist and which gradually disappears in the course of a few weeks, provided, however, that the bile is not in a state of decomposition as is not uncommon when an animal suffers from Rinderpest. Under such circumstances an abscess may form, which, however, does not seem to be detrimental to the process of immunisation.

"Both these above-mentioned facts convince me that Rinderpest can be eradicated with but little difficulty, and within a comparatively short time, by putting these methods into practice. The method of immunising cattle with serum may be used in order to separate from infected areas those tracts of country which are still free from the scourge by means of forming a broad belt between them in which all the cattle are inoculated with the vaccin. The protective properties of the bile will be of inestimable service in infected parts. Nearly every case of Rinderpest supplies a greater or lesser quantity of vaccine for those animals which are still healthy. I cannot but urge upon you the importance of bringing this method immediately to the notice of those cattle-owners whose animals are suffering from, or threatened with, the disease, as I am sure thousands of cattle may daily be saved by its application"

"The *modus operandi*," adds Dr. Koch, "is very simple in both these methods." We hope to hear before long that the Government Veterinary Surgeon has begun acting upon the results of Dr. Koch's important work in a systematic manner. So far we are not aware that any systematic veterinary investigations have been carried out in the island. The life of a Veterinary Officer in an island like Ceylon, if he is to prove really useful, must needs be a very active one, as active if not more so, than that of a medical inspector. We learn that in the Cape the services of the Government Veterinary Surgeon are available to anybody in the Colony, and that that officer must attend upon, or give advice regarding any case reported to him free of charge. This is as it should be, provided that the officer is well remunerated by Government and that all cost of travelling is also refunded.

There is no gainsaying the fact that the prevalence of cattle plague in the country divisions (reports of which are given month after month in the season reports published in the *Gazette*) accounts for a good deal of the failure which frequently attends cultivation in our villages. We trust, therefore, that Government will see fit to direct the Colonial Veterinary Surgeon to carry on his work in connection with the suppression of Cattle Plague, on the lines indicated by Dr. Koch, and to make a report on the results of that work.

PLANTING IN BRITISH CENTRAL AFRICA.

The first foal born and reared in British Centra Africa is now being broken in at Zomba for rid ing. It is a very tractable little animal and pro mises to turn out useful. It is a stallion, and we will hope may be the sire of a future Shire Highland breed.

During the last few weeks plantations in the Zomba District have been simply flooded with Anguru, Anyasa, and Mangoche men. This is a new departure at this time of the year, we understand, and no doubt those planters who benefit by it will welcome it.

Nkauyela, a chief on the shores of Lake Chilwa, has of late been sending in messages to Zomba and assurances of his desire to be great friends with the Europeans. His assurances have also been accompanied by a fair number of workers, Anguru. From the Namaramba country, north of Lake Chiuta also labourers are beginning to come in.

The African Trans-Continental Telegraph Company have very liberally offered, if the Collector at Chiromo will from time to time wire to Blantyre the movements of steamers, mails, &c., on the lower river, to send out notices to the different offices at Blantyre and Zomba. This no doubt will be a great boon to all Blantyre and Zomba residents.

The Telegraph Company are making excellent progress with the construction of their line towards the north. The wire has now reached the Upper Shire and will before long be at Fort Johnston; and Major Forbes hopes that the present year, the "Soixantaine," will before its close see the north of Lake Nyassa in telegraphic communication with London.

On the Mlungusi Estate of Messrs. Buchanan Bros. a number of orange trees are now in full bearing.

Out in the Mlanje-Zomba plains, on the Ntondwe river, there were recently found a number of lemon trees bearing heavily. As they are near to the site of the original "Magomero" Mission station it is supposed that the trees must have been planted by the first missionaries established in B. C. A. The fruit though very large and of good flavour, has an unusually thick skin.—*B. C. Africa Gazette*, April 1.

POLISHING A PAIR OF HORNS.

Remove all the rough outer part with a rasp, followed by a file. Then well scrape with a knife, steel scraper, or side of a steel chisel to remove all file marks. Then standpaper off with various sizes of sandpaper, finishing off with the finest. Now carefully dust to remove any particles of sand, and repeat this dusting between every two of the subsequent operations. To polish the horns, apply, by means of a rag dipped in linseed oil, some of the horn-dust saved during the previous processes, and rub smartly. Next apply some putty-powder or rottenstone by means of a flannel damped in water, and again use plenty of rubbing. Whiting is next employed by the aid of a rag damped in vinegar. Follow this with a chamois leather and a little oil, then with a clean dry leather, and finish off with a sharp rubbing with the bare palm. Or a lathe and various "bobs" can be used in polishing.—From "*Work*" for April.

"QUININE AND CINCHONA BARK."

We have been greatly interested in a very full and carefully prepared historical and commercial *resumé* recently published under the above heading by the New York *Oil and Drug Reporter*. It begins with 1871, the year when the journal was first issued, and it deals freely with the American quinine manufactories, at Philadelphia and elsewhere, all of which we personally visited in 1884. In 1871, quinine was about 11 shillings an ounce, protected in the States by a duty of 45 per cent; reduced in August 1872 to 20 per cent. "Chills and yellow fever raged in the summer of 1872," we are told and the consumption of the alkaloid was large. It was even proposed to grow Cinchona bark in the South Western States of the Union; but Ceylon and India, with their cheap supplies, soon settled that. In 1877, however, the cost of quinine advanced to 18 shillings an ounce—but only very temporarily. Early in 1879, the price began to go down and the tax on imported quinine was abolished. The New York *Sun* then published the following poem on the "emancipation" (?) of that portion of the human race domiciled in the United States :

Rejoicings ring throughout the land.
  Quinine is free! Quinine is free!
Its bonds are burst, its shackles fall.
Send the glad news to one and all,
Through shanty, tenement and hall—
  Quinine is free! Quinine is free!

Malaria flies in wild alarm.
  Quinine is free! Quinine is free!
And fever hides her burning head,
And ague totters off in dread—
Economy quinine had wed!
  Quinine is free! Quinine is free!

* * * * * *

Now all one saves in Jersey rents—
  Quinine is free! Quinine is free!
In dollars, dimes, in cents and mills,
Won't go to pay the doctors' bills,
Or druggists' for Peruvian pills.
  Quinine is free! Quinine is free!

Hope dawns again upon our land.
  Quinine is free! Quinine is free!
All joyful shout from near and far,
"Hail, quinine, sugar-coated star."
And ague trills "Hurrah! Hur-r-r-rah!"
  Quinine is free! Quinine is free!

Some of the minor alkaloids came into use after this and still further affected the price of quinine pills of which, however, were getting into universal use throughout the States. The demand in 1881 increased by 25 per cent, and American manufacturers turned out 1 million ounces—other makers' returns being as follows :—

	Ounces.
Howard	350,000
Whiffen	122,000
Jobst	315,000
B. & S. Mannheim	315,000
Brunswick	210,000
Zimmier	210,000
F. Koch Oppenheim	52,000
Pelletin	140,000
Trillardieo	140,000
Schissmann	35,000
Dufour Fratilli (Genoa) ..	105,000
Lombard, Milan	1,400,000

The capital stock of the last-named concern was $800,000.

Here is one interesting bit :—

Early in the year 1884 Stallman & Fulton became agents for Zimmer's brand, which was put out in an entirely new dress. On Feb. 28 occurred the fire in Powers & Weightman's factory, which started in the bark grinding department. The damage amounted to $300,000, and affected the quinine factory, the bark mill and the opium and morphine warehouses. Mr. Alexander Boehringer had just arrived from Europe, and been taken off on a tug in the lower bay, by his friends, so that his presence here might not be generally known. He went direct to Philadelphia and offered the use of the Milan factory to Powers & Weightman, pending the rebuilding of the works. His offer was accepted, and in March Dr. John F. Weightman sailed for Europe to perfect arrangements for placing goods on the market as soon as possible. In the summer the Milan factory failed, with liabilities of 18,086,043 francs, and assets of 12,617,489 francs. The capital of 6,000,000 francs had disappeared.

Our proposal at this time in the *Ceylon Observer* to introduce quinine into China as a substitute for opium, and also to use it for horses and cattle, is specially noted by the reviewer. A little later, the price was down to 2s 3d the ounce and the yield from the Ceylon barks alone was five times the consumption. In 1887, we read:—

Toward the end of the year people began to talk of a combination. Keasby & Mattison issued a circular, in which they stated that quinine could, and would, be sold at 25c. (1s 1½d) at a profit, and that Java barks would make this possible.

Passing on to 1892 :—

Apparently the Java planters did not tire trying to improve their position, as they formed a syndicate early in 1892, to which 500,000 florins was contributed which was to be used to bolster up the bark market at the auctions. They succeeded in bidding up the price, but it appears that the higher bark went the lower quinine went, as there seemed to be no prospect of a combination of the manufacturers being formed. Furthermore, the Baring failure had compelled the throwing on the market of a large lot, which had a depressing effect.

Finally, of 1896, we read :—

The year just closed witnessed a complete collapse of the market, in spite of which the agreement between the manufacturers remained unbroken. While Ceylon had become of little or no account as a producter of bark, the exports from Java had increased enormously, and manufacturers found that they could not take all that was offered. They therefore allowed the market to take its course, with the result that the lowest price on record was reached during the year. European competition was threatened, and with a promise of the early operation of the Java factory, they determined to reduce the price of the alkaloid as a measure of self-protection. As indicating the view of the situation which was held by dealers, large sales were made at 25 cents in July from second hands. The first official drop was announced Aug. 17. It amounted to 3 cents, which brought the price down to 25@27 cents, according to brand. A week later there was a further drop of 3 cents, and on Nov. 2 the price was still further reduced, this time 4 cents, making it 18@20 cents. Second-hand holders were completely demoralized at each successive drop, but they followed the market in its downward course. There are several holders of quinine who purchased large quantities of it on speculation at prices ranging from $1.50 down to about 30 cents, and many of them still hold their stocks, in the hope that some day or other conditions will improve to such an extent that they may be able to dispose of them, if not at a profit, at a smaller loss than they would be compelled to submit to if they sold at the price at the close of the year.

MEXICAN INDIA-RUBBER.

The popularity of the cycle and the introduction of electric motor cars has caused such a "run" upon India-rubber that those engaged in the manufacture of tyres have begun to realize the great risk there is of supplies becoming exhausted. The formation of the India-Rubber (Mexico) Coy. Ltd., will therefore be hailed with satisfaction, by the "trade," and we should fancy that the promoters will have no difficulty in disposing of all the available shares. The Company has been formed to acquire plantations in Mexico (known as "La Esmeralda" and "Llano de Juarez") of over 440 square miles of freehold land with 350,000 Indiarubber trees already available for tapping. The estates also carry a great deal of valuable timber, and certain portions of them appear to be adaptable to the purpose of growing cacao trees and coffee plants. There are also large plantations of chick gum trees, which produce the chewing gum so popular in America. The share capital is £406,000, divided into 400,000 ordinary shares of £1, and 6,000 deferred shares of £1 each. The latter will not be be entitled to participate in the profits of any year until fifteen per cent. for that year has been paid on the ordinary shares, when they will be entitled to one half of the remaining profits distributed as dividend. There is also an issue of £200,000 seven per cent. first mortgage debentures of £50 each, redeemable after five years by annual drawings at £60 each, at the option of the directors. A working capital of £50,000 is provided for, and the vendors take £556,000 for the properties, payable as to £150,000 in cash, and as to the balance in cash or shares, or partly in both, at the option of the directors.

Turning to the details given in the prospetcus we find it stated :—

The consumption of india-rubber by six countries now exceeds 100,000,000 lb. per annum, worth about £10,000,000, and during the last few years the demand for it has increased enormously, and is still increasing; whilst hitherto practically no steps have been taken to meet this growing demand, or to provide for the world's future requirements. Up to the present time nearly all india-rubber has been obtained from wild trees, but it is admitted by those most competent to give an opinion that such a sonrce is barely adequate to meet the present demand, and that the supply of the future will have to come largely from trees properly planted and cultivated. This view is corroborated by the following extract from a recent report to the Foreign Office:—"Judicious 'tapping,' with due regard to the life of the tree and its future usefulness, is the exception; rubber-bearing trees are ruthlessly sacrificed by irresponsible seekers after wealth, and dead trunks are becoming a too familiar feature in the landscape of the productive districts. Sooner or later a purely destrnctive policy or this kind mnst etxhaust the richest country."

SUBSIDY TO PLANT RUBBER TREES.—A subsidy has been granted to the owners of the "Llane de Juarez" by the Mexican Government, providing for a Treasury payment of 3 cents for every india-rubber tree planted which attains a certain growth up to a limit of 15,000,000 trees; equal to about £3,000 per million trees, the trees to be planted at the rate of 1,050,000 per annum. The first year's yield in 1905 from the million trees to be planted this year should be £250,000 rising in 1908 to £500,000. The first year's yield in 1906 of the million trees to be planted next year should be £250,000 rising in 1909 to £500,000, and so on. Under the concession granting the subsidy, the Government has the right of pre-emption at the end of 99 years of the lands planted (with the buildings and utensils) at a valuation less an amount equal to double the amount paid by way of subsidy under the concession.

If from any unforeseen causes the estimates of revenue contained in the prospectus, and upon which the directors are proceeding, should not be realised in their entirety, there is an ample margin shown in the estimates to provide for every contingency, after payment of handsome and yearly increasing dividens.

DEMAND.—India-rubber has become absolutely indispensable to the cycle tyre, electrical motor cars, cab, and innumerable other manufacturing industries. It is a matter of common knowledge that they consumption of india-rubber in the manufacture of cycle tyres alone has grown by leaps and bounds. In 1886 there were 68 cycle factories in England—there are now more than ten times that number. In France, America, Germany, Australia, and other countries there has also been a large development of the cycle trade. In 1896 no less than 262 undertakings dealing with the cycle and motor industries were registered in London alone, with a total capital of £19,898,464 The increasing demand for India-rubber has caused manufacturers to awake to the problem of a threatened exhaustion of supplies ; it is, therefore, beyond question that this Company will supply a want distinctly felt by all manufacturers using india rubber and that it has every reasonable prospect of richly rewarding its shareholders.

TREATMENT OF RUBBER.—It is intended that the rubber shall be collected and treated under the care of a resident rubber expert on the most approved scientific principles, so as to command the highest market price quoted for the best samples of raw rubber. Such rubber on the market is worth about 3s 6d per lb, and its superiority over other rubbers is due to the scientific methods employed in its collection ensuring freedom from dirt and impurities. It is anticipated that by the adoption of similar means in gathering the product of this Company's estates it will, instead of realising 1s 8d per lb net, find a ready sale at 2s 6d per lb net. Hitherto there has been but a comparatively small output of india-rubber from Mexico, collected in a most primitive fashion, and although in addition to the Company's plantations wild rubber trees grow in great numbers upon their lands, no organised efforts have been made to exploit the industry. No comparison, therefore, can be justified between the raw rubber which this Company proposes to put upon the market, and that of any other rubber which has ever come out of Mexico.

TEA AND COFFEE IN CEYLON.—A colonist of the "forty-fifties" writing from London by a recent mail, gives some advice to planters :—

Tea Company forming, I notice, still goes on and large prices continue to be given for estates. I met Mr. Tom Gray just before his last visit to your side, and was glad to find his great confidence in the tea enterprise. There will be ups and downs as in all enterprises, There will be those who have paid too much for their whistle ; many who have cultivated without proper regard for economy ; and wiser men who worked cautiously, careful of expenditure, avoiding as much as possible loading their properties with debts for advances from capitalists. The same varying fortune will characterise the tea as formerly the coffee enterprise.

When I arrived at Colombo in 1841 in Messrs. Tindall's ship "Achilles," there was another ship, the "Euphrates," also owned by Mr. Tindall, destined for China, with one more vessel, a charter for oil by Wilson & Co., afterwards Wilson, Ritchie & Co., ; 3 ships in all ! How many now ? The reply will show the advance Ceylon has made.

In the present day, our harbour has often, 18 or more large ocean-going steamers at once within its bounds at anchorage.

ROSES IN CEYLON.

(By a Practical Horticulturist.)

May 10th.

Of all plants grown in Ceylon for their flowers none gain so much the admiration of lovers of flowers (and who are not ?) as the Rose. It is not therefore surprising that queries regarding it are so frequent and varied; and "Lady Horticulturist" in your issue of the 26th ult., renews the subject. There is probably no householder in the island possessing any piece of a garden, large or small, who does not find a corner therein for *Rosa*; yet it is but comparatively few years ago that the introduction of this favorite into Ceylon would have been considered as unlikely as that of the Scotch heather would be nowadays. Temple offerings of flowers of the jasmine and the temple-tree, which with true followers of Buddha have always been considered indispensable at temple ceremonies, seem now to be giving way to the more delicate charms of *Rosa mal* (rose flowers). When paying afternoon visits, incorporated in the conversation about tea, labour, and cacao disease, must assuredly be "Our Roses."

The Thistle it must be admitted has charms all its own, the old Shamrock recalls the hearts of the truest patriots, and the gallant little Leek is doubtless useful in its own sphere, finding as it does particular favour under the name of *Lunu* with curry-stuff connoisseurs in Ceylon; but the Rose has floral beauty that is at once striking and superlative, and is justly designated the queen of flowers. It is the national emblem of England; it is the favourite flower of Queen Victoria and also, I believe, of her representative in Ceylon, Her Excellency, Lady Ridgeway. It stands as the head (or type) of a family unsurpassed for beautiful and fragrant flowers and luscious fruits; *e.g.*, the peach, pear, apple, strawberry, not forgetting our familiar loquat.

Probably no other genus of plants has received so much attention from authors and poets of all countries as has Rosa. To Aurora, it was dedicated as the emblem of youth; to Venus, of love and beauty; to Cupid, of fugacity and danger. The latter, according to classical writers, gave it as a bribe to Harpocrates, the God of Silence, hence the saying, "under the rose."

The rose is almost as cosmopolitan as a Scotchman. Left to itself it finds a congenial home as far north as the sub-alpine zone, and by cultivation it flourishes in equatorial regions. Apart from its floral attractions, it forms an important factor in commerce, the manufacture of rose-water and attar alone giving employment to perhaps millions of persons. This is an industry which should be peculiarly adapted to the Sinhalese villager, and as roses may well be grown on a large scale up-country, who can say but the precious and expensive attar may in the no distant future, figure prominently in our sources of revenue.

Rosa contributes largely to our Materia Medica. "Dr. Lindley, one of the most earnest defenders of its powers, has not hesitated to assure the world that the Pharmacopœia should be formed of roses alone."

It has been well said that a garden without roses is a misnomer. The fine display of these at the recent Nuwara Eliya Show was in itself proof of the success that can attend their careful cultivation in the island. Roses are not so difficult to manage as is generally supposed, the chief difficulty, in the low country, really consists in suitable soil not being available in large enough quantities. In selecting a site for a rose-bed, or beds, it is a mistake to choose a shady place, as some people do with a view to sheltering the plants from the sun and heavy rains. An open airy situation is best; trespass of roots from surrounding trees which impoverish the soil and rob the plants of the manure intended for them is to be guarded against; it being often necessary to cut open a deep drain to check their transgression. Roses delight in a loamy and somewhat tenacious soil, which should be enriched by occasional applications of farm-yard manure. As to pruning, they yield best to this operation at the beginning of the monsoons. It is a great mistake, as many find from experience, to prune severely if any, in the hot and dry months which is practically winter here (paradoxical though it sounds), because growth is then more or less inactive. At this time they will also greatly benefit by having the earth about them covered with dead leaves or litter to prevent excessive evaporation of moisture from the soil and check the penetration of the fierce sun's rays to the roots.

PROPAGATION.—It is comparatively easy to propagate roses by means of "cuttings." There are two distinct ways of performing this operation: the right and the wrong way; the latter being generally followed by our garden wallah if left to himself. Send him to plant a bed of rose cuttings, and ten chances to one he will proceed something after this fashion. He will carefully stir the soil with his mamotie, and will then assume the sitting posture peculiar to his class, *i.e.*, by resting the posteriors on the heels with wonderful agility and perfect ease; after taking considerable pains to make a smooth surface by means of a splinter of bamboo he will proceed to insert the cuttings (merely sticking them in the soil) packing them together in the line as closely as possible, and taking particular care to have all the upper ends on a uniform level, but paying little or no heed to the portion of the cutting in the ground. Most probably not more than one per cent of these will grow, and as decay sets in, white-ants begin to make food of them; consequently *Termes fatalis* is severely railed at for having "destroyed the rose-cuttings," which, as a matter of fact, are dead before they are thus attacked.

It need hardly be said that if we wish for better results a different method must be adopted, and Ramasamy will have to be taught by practical demonstration that a roseplant requires to be differently treated from a tea-bush. Get him, if you have not the time or inclination yourself, to dig the bed quite a foot deep, at the same time mixing in some manure and a quantity of leaf-mould, if available; rake over the surface, not too finely, but evenly; open across a shallow trench about 6 inches deep; place the cuttings sloping-wise against the steeper side at least 4 to 5 inches apart, about which sprinkle some sand (river-sand preferably) and fill in with the soil, pressing it moderately firm around the planted cuttings; open the next line about 7 inches distant, and proceed in the same way. In preparing the cuttings all the buds should be carefully preserved, and it is not by any means necessary to strip off all the leaves which are to be above ground; these had better be left to wither away of their own accord, for as long as any green is left they will supply some nutriment to the cutting, and when withered will afford shading to some extent. It is of course essential after planting that the cuttings be kept shaded (cadjan leaves being most convenient for this purpose) and the ground moist until they show signs of making young growth.

VERMIN.—In this country no enemy of the Rose has a worst reputation than the white-ant; yet, as is already pointed out, on careful examination I have no doubt it will be found that all healthy plants are altogether secure from its attacks, its ravages being confined to diseased or decayed vegetable matter; so that it may really be regarded as a useful scavenger. However, the presence of white ants in a garden is by no means to be desired. The most reliable means of diminishing their numbers is by digging up their nests or haunts and destroying the queen-ants. Roses that are infested with thrip, black-fly, and such like, should have frequent syringings, morning and evening. If that is not effectual, dilute a wine-glassfull of kerosine oil to a gallon of hot water, and apply quite hot by a syringe. But roses are said to be as yet more free of insect pests and parasites in Ceylon than in any other country in which they are cultivated, and that they may long continue to be so will be the wish of all of us.

ANNUAL RINGS IN THE NIM TREE.

In Gamble's Manual of Timbers it is remarked that it is not known whether the rings in the wood of the Ním tree (*Melia indica*) are annual or spurious. There is a forest plantation of Ním at this place (Tummuru Kodu) in which Ním trees were planted 14 years ago. I had some of them felled lately, and examined the rings. I found that the 14 annual rings were clearly marked, but that in addition there were other spurious rings which however did not go round, but merged into the annual rings. In fact the spurious rings seldom went more than a quarter way round. If the rings of the Ním are counted care will have to be taken about these spurious rings. A. W. Lushington.—*Indian Forester.*

THE PALMYRA PALM.

How very closely palmyra leaves can sometimes pack themselves on the stem. Of course the majority of the leaves die off, only about 6 or 8 remaining alive at a time. The diagram is supposed to represent the unrolled circumference of the tree, and in a height of 3 inches from base of petiole to base of petiole 17 leaves were crowded together. The young leaf petiole, when green, is sheathing, but when the leaf dies and the stem distends, the sheath splits, making the base of the petiole appear forked. A scar is left behind on the stem the whole horizontal length where the leaf has at any time adhered. The leaf scars form almost continuous spirals round the tree, and I fancy that by their means a rough approximation of the age of the tree can be made. Here the trees yield on the average 10 leaves per annum; 17 leaves gave 11 rungs of the spiral ladder, so that there would be 6 such rungs per annum. This requires further elaboration, but I thought perhaps this might be of interest to you. Since writing the above I have had the opportunity of examining a great number of palmyras, and find that almost invariably the leaves come off the stem in whorls of 3, the bases of their petioles either touching or slightly overlapping. This fact is rather interesting as an extension of the trimerous formation of the floral organs of most monocotyledons. Of course the three leaves of the whorl in palmyras are not synchronous, one develops after the other. Since writing I have also come across the following, in Lindley's Introduction to Botany:—"It is said that the number of external rings which indicate the fall of leaves from the trunk of the Palm Tribe coincides with the number of years that the individual has lived. There is, however, no proof of this at present; such statements 'must therefore be received with caution." If, as is said, from 10 to 12 leaves form in each year (I am now making experiments to test the accuracy of this), then, as three leaves go to form one of the external rings above referred to, from three to four of these external rings coincide with a year's growth, and not one only. A. W. Lushington. —*Indian Forester.*

CEYLON TEA PLANTATIONS COMPANY.

(*Special Report for "Tropical Agriculturist."*)

The annual ordinary meeting of shareholders was held at the offices of the Company, 20 Eastcheap, London, on Thursday, April 29th, the Chairman, Mr. H.K. Rutherford presiding.

The Chairman, after saying that, though the accommodation was smaller in the new offices than they had been used to, there seemed to be ample room for all the shareholders who cared to attend, and remarking that if the smallness of the number of shareholders attending the meetings was a gauge of the prosperity of the Company the Directors would never want to see more gentlemen present than were there that day—(laughter and hear, hear)—said:—In submitting the Report and accounts for your consideration (which I presume you will as usual take as read) it has been my pleasant duty on previous occasions to congratulate you not only on the favourable results of each year's working, but also on the sound financial position of the Company: and I venture to think on reference to the balance sheet now presented you will consider the traditions of the Company have been maintained. There is I think nothing in the figures of the balance sheet or profit and loss account requiring elucidation, but I would draw your attention to the fact that the capital cost of the tea properties with their buildings and machinery remains at practically the same total amount as last year notwithstanding we have added 265 acres to our tea acreage and also to our factory accommodation and tea machinery. Allowing for reserve fund and depreciation, the cost of the tea estates stands at about £22 per acre. The net profit for the year amounts to £48,986 10s 8d and we have placed £4,000 to depreciation, and added £15,000 to the reserve bringing this fund up to a total sum of £85,000 or £3,920 over the par value of the preference share capital. At the end of the year we had £34,469 of this reserve in good securities and £38,403 invested in coconut properties. The balance is at present being utilized in the general business of the Company, but will be invested as opportunity offers. We have planted up 572 acres with coconuts during the year and we are fortunate in having a most favourable season for putting out the young plants. The lands we have in bearing gave us a profit of £1,139 and we confidently look for a steadily increased return as with the better system of cultivation now adopted in comparison with the native treatment the trees should give a larger yield of nuts. We are now completing the erection of a fibre mill on the Mawatte Estate which we trust will be in working order next month. As the coconut lands come into bearing the profits accruing from our reserve will very materially increase and it is our belief that we have placed these funds in an investment which will not only prove profitable, but which also affords you as safe a security as can be found in agriculture, while at the same time having it under your own control. Turning now to the working of the tea properties, it is gratifying to find that there is no diminution of yield as the trees increase in age. The crop harvested was equal to 470 lb. of tea per acre over say 8,000 acres—a yield which is the highest average we have reached, but which, although an exceedingly fine out-turn over such a large area, will, I am sure, be eclipsed when the considerable acreage of comparatively young tea, especially on Glenlyon and Tangakelly estates are more mature. On the question of crop as far as we can see we have but little to fear. As to price, notwithstanding that Ceylon and India's crop last year exceeded all previous years by 17½ millions of pounds, the price of this Company's tea was not affected by this considerable excess as its average price was slightly better than that of 1895. Exchange, entirely beyond our control, affected us adversely as compared with 1895, diminishing our profits by about £5,000. Our teas cost somewhat more to produce last year which is accounted for by increased cost of firewood, in the plucking, owing to a prevalence of wet days, in expenditure on manuring, buildings and machinery and also the increased

cost of rice to our coolies owing to the Indian Famine. (Cheers.) The labor in Ceylon has lately become somewhat unsettled and this is attributed, I believe, in great measure not so much to a shortness of supply as to the action of certain new estate owners holding large interests in tea. (Hear, hear.) These proprietors or their representatives, either through ignorance or a total disregard of the system and customs hitherto in force as unwritten laws, have, by the heavy advances paid to secure coolies, while these coolies are employed on other estates, so unsettled the whole labor force of the island that it is to be hoped that some energetic steps will be taken by the planters of Ceylon to mitigate the evil, before it assumes greater proportions and thereby becomes even more serious than what it is at present. (Applause). I am glad to say the labour force on the Company's estates is reported as being ample at the present time. To those shareholders who do not know the extent to which we are employers of labour it may be interesting to them to learn this Company employs 9,000 coolies and this army has to be provided by us with rice, their staple food, and when this commodity reaches famine prices, the loss does not fall on the labourers but on the employer. I may here incidentally state that the directors subscribed on the Company's behalf £50 to the Indian Famine Fund which I am sure will meet entirely with your approbation. I merely mention these various details affecting the cost of production as it might be thought by shareholders not conversant with tea planting that if we can produce a pound of tea at a certain low figure one year we should be able to do so every year. Fluctuations there will always be, but we can only hope that a high cost of production, together with a high rate of exchange and low prices will not come in conjunction (Hear, hear.) As you are aware our Company acts as agent for several smaller tea Companies and private proprietors, and, business resulting therefrom to a large extent provides for the London expenditure in working the C. T. P. Company. This branch of our business has increased so much that it has been necessary for us to move into the somewhat larger offices than those we formerly occupied, and to which we welcome you today. The interesting record of our ten years' work, which is shown in the statements attached to the report, is the best evidence we can give you, not only of our own work in your interest, but also of all those in our service in Ceylon, and you may rest assured that the same care and vigilance to secure the best results will be exercised in the future conduct of the affairs of the Company as has been in the past. (Hear hear). It is highly encouraging to our enterprise that the consumption of British grown tea is steadily increasing outside of Great Britain. (Hear hear). Indian and Ceylon teas in 1894 were taken by other countries to the extent of 27,000,000 lb. and in 1896 to 40,000,000 lb. or an increase of fifty per cent ; and it is a further matter of congratulation for Ceylon growers to know that 70 per cent of this increase was contributed by Ceylon. America and Canada in 1894 took 4,700,000 lb. of British grown teas, and last year 9,500,000 lb. so that if the combined efforts of India and Ceylon are continued with persistency we may hope to see in a few years' time a very greatly increased volume of our teas being taken by these countries. Mr. Talbot, who has just returned from Ceylon, is here today, and is in a position to tell you how your various properties were looking, as he visited all the estates in which we are interested. (Hear, hear). We shall be very pleased to reply to any shareholder who wishes for information on the subject of the report and accounts which I may have omitted. The Chairman then moved the adoption of the report and the payment of a dividend of 8 per cent, making a total of 15 per cent for the year. (Applause).

Mr. G. A. Talbot seconded the motion. He said he had been all over the properties in Ceylon The points to which one looked for the permanence of tea on the continuance of good bearing were chiefly, the way in which the bushes were plucked, and the way in which they were manured. The plucking, he had no hesitation in saying, was very carefully done in 1896. The bushes had not been hard plucked. As regarded exhaustion, only the minimum had been taken out of them, and if for any reason the Company wished to get more out of the bushes and decided to pluck them hard they could very greatly increase the yield. As to young tea, the policy they pursued before had been carried on—letting it come to full size before being plucked at all. Their fields were healthy. They had not done much artificial manuring. During the past two years they had done a good deal in the direction of natural manuring ; they had planted grass and built cattle sheds, and the present manager and the superintendents under him were anxious to extend this system as far as possible. As to the coast advance question, which was a burning question for them, he would explain that the coolies came from Southern India and the planters gave coast advances to men to bring them over. When the coolies left the Ceylon estates they had only to pay for the debt incurred in bringing them from India. For some years the system worked well, as the amount of advance was not excessive. But some capitalists had lately come to Ceylon anxious to open large acreages for tea, and had offered large sums for coolies to go into their employ. R100 had been offered. This was more than the average Oriental could ever pay back, and the result was very demoralising. (Hear, hear.) He felt sure those interested in these Companies at home were not aware of the evils of this system, and that was why he spoke out so fully about it. It was obvious that if one advanced to any labourer more than he could ever pay back, it was demoralizing because he knew all his wages would be taken to pay the debt, and he was therefore not anxious to do any labour at all. The people who had paid these big sums had recently written them off in many cases, he was told. If those who advanced money knew they would not get it back, it became a bonus, and gave a dangerous advantage to one estate over another. He was told the system was temporary, and he hoped it would soon be stopped. The present advance paid by the C. T. P. Co. was R16 per head. If the system were to continue the amount they would have to advance to retain their labourers would be very considerable, and the cost of producing tea must of necessity increase. He would like to add that he was very well pleased with the feeling amongst their superintendents in Ceylon. They had their estates in good order, and he believed they were proud to be Superintendents of the Ceylon Tea Plantations Company. (Applause.)

The motion was carried.

The CHAIRMAN proposed the re-election as a director of Mr. David Reid. This was seconded by Mr. W. Herbert Anderson and carried.

On the motion of the Chairman, seconded by Mr. D. Reid, Mr. G. A. Talbot was also elected a director.

The Auditors were re-elected on the motion of Capt. Fuller, seconded by Mr. W. M. Leake.

A vote of thanks to the Chairman closed the proceedings; the vote being made to include the staff in Ceylon, on the suggestion of Mr. Dangerfield.

[It is certainly no wonder that this premier Ceylon Tea Company should be considered to occupy a position of unequalled stability when, as its Chairman shows, the capital outlay only represents £22 per acre of tea! Recalling besides the profitable use made of the reserve in coconut plantations, the growing income therefrom and the extension of business towards desiccating mills as well as general Agency for small Companies and business concerns,—it is a question whether, even now, the shares are up to their real value. The high average yield per acre of tea is, as might be expected from the splendid condition of the estates as reported on by Mr. Talbot. This is still further shown, as well as the good management in field and factory, by the fact that the Company's teas realized rather better prices last year than in 1895, notwithstanding adverse exchange. We suppose of no other Company connected with Ceylon can this be said? Finally, the Chairman and Mr. Talbot made reference to labour difficulties and spoke out plainly about the upsetting of old arrangements by newcomers to the island anxious to get through a great deal of work and to gather together as much labour as possible on the spot. But we are not sure of this story and the inferences therefrom being altogether correct. At any rate, we have heard another version with quite a different appearance from the Visiting Agent of the new enterprise, who pleaded that the average of advances was, considering all things, fairly moderate. The Ceylon Tea Plantations Company, with its army of 9,000 coolies, has certainly a vital interest in maintaining the regularity and sufficiency of the labour supply on which the prosperity of Ceylon so greatly depends.—ED. *T.A.*]

THE COCONUT MARKET.

The tone of the market shews a tendency to weakness, but high prices are still demanded for properties and there is an increasing demand for land for cultivation. In the Kurunegala District, the price per acre has run up to three or four times what it was about three years ago. The European market is flat for this line, and the bulk of our shipments find an outlet in America. It is said though, that there will be a less demand there for dessicated coconut from Ceylon before very long.

The market in copperah is also flat, and there is just enough produced for local consumption by the millers, while a few hundred candies are purchased now for direct exportation by Messrs. Volkart Brothers. Prices in this line range from R32 to R43. Jaffna and Batticaloa copperah fetches the biggest figures. Oil is selling at R13 per cwt. (naked), and sellers are not very keen. The heavy drop in oil is attributed to the fact that a large quantity of tallow in Europe is admirably replacing our produce. In poonac (mill) tbe market is steady. Latest quotation is R65. Nuts are selling at R35 to R40, with very little demand for them.

In the fibre business, the market is practically lifeless. A couple of years ago, there was a rush at fibre and yarn making, and everybody who could command a little capital went headlong to manufacture. Many were the little stations along the Negombo and Kandy roads where fibre was turned out. The stocks, were, of course, of all qualities, and in Colombo found many a purchaser who consigned the stuff to both the European and Australian markets. Most of the shippers were from the Pettah, and their stocks glutted the market in London so much that a heavy drop in price was inevitable. How the transactions turned out, the Pettah shippers will best be able to tell! Most of the "fibre mills" have stopped work, after teaching a capital lesson at some expense.

The immediate prospects of the market are poor, but there is sure to be a "turn in the tide" before very long.—*Cor.* Local "Times."

INDIAN PATENTS.

Applications in respect of the undermentioned inventions have been filed, under the provisions of the Inventions and Designs Act of 1888, during the week ending 24th April 1897 :—

Improvements in tea dryers.—No. 157 of 1897.—Frank Edmund Winsland, tea planter, Joyhing, North Lakhimpur, Assam, for improvements in tea dryers.

The fees prescribed have been paid for the continuance of exclusive privilege in respect of the undermentioned inventions for the periods shown against each :—

Improvements in the method of an apparatus for drying tea leaf.—No. 80 of 1888.—Henry Thompson, engineer of Trinity Street, Gainsborough, in the county of Lincoln, for improvements in the method of and apparatus for drying tea leaf. (From 17th April 1897 to 17th April 1898.)—*Indian and Eastern Engineer*, May 8.

COCONUT PRODUCTS.

The announcement made of the probability of another establishment for desiccating coconuts being presently started in the Chilaw district, has some bearing on the position and prospects of the great coconut industry. Its development and extension within the last 15 or 20 years has been remarkable, if not phenomenal. Until 1890, after which year it was that desiccated coconuts began to have a place in the Chamber of Commerce Tables of Export, coconut oil was the chief, if not only, considerable product of the palm which was booked for export. To be sure, coir in its various forms of rope, fibre and bristles, and poonac, formed part of our exports for considerable periods; but even then aggregate value did not count for much. In later years, coconuts themselves, husked and unhusked, came to be exported to the Continent and the United Kingdom, but the highest record has, we believe, been during last year, when close on 14,000,000 nuts were exported. But even that represents but a fraction of our total produce of several hundred million nuts. As we have said, it is only during the present decade that desiccated nuts entered into our Export Tables; and yet from before that period the extension of plantations had grown to be considerable for several years. There can be no doubt that the desiccating business gave an impetus to the industry; but, as we saw in an article last January, the falling-off in the exportation of oil has more than counterbalanced the advantage gained through the new manufacture.

The total quantity of desiccated coconuts exported last year was over 10,000,000 lb. which would be equivalent to about 30,000,000 nuts. The falling-off in the export of oil, however, represents about 100 million nuts! Thus, last year we sent away only 343,000 cwt. of oil—the lowest figure for the past ten years, if we except 1887. In 1892 the exports amounted to 550,000 cwt. The difference, therefore, between 1892 and 1896 was as much as 217,000 cwt., and each hundredweight of oil may be taken to represent 500 nuts. The present year shows no improvement in the demand for oil. On the contrary, there is a falling-off, though not very considerable, up to date; while the price has been about the lowest on record. The explanation of the last-mentioned fact is that tallow has been uncommonly cheap in Europe and in America, naturally affecting the demand for oil for soap-manufacturing purposes. Happily, India has come to the rescue, and taken away much more than America and the United Kingdom combined. And Singapore, too, has proved a good customer, having taken away over 15,000 cwt. as against 10,000 by America and 20,000 by the United Kingdom. The leap by India, from 16,000 for the first 4½ months of last year to 47,000 cwt. for the corresponding period this year, is promising; but still, both the total quantity of oil exported and the prices which rule, prove that the markets of Europe and America must govern prices; and the prices of nuts must be largely governed by the ruling price of oil. We are not of those who believe that the desiccating business has no influence on coconut prices. Such a belief is obviously untenable, in presence of the facts and experiences of the past few years. Still the 250,000,000 nuts which may be taken as a high average for the oil we export, must have a greater influence on the market than the 30,000,000 which the desiccating business represents. The fall in prices of nuts this year, as compared with last year, represented by R5 to R6 per thousand, illustrates and gives point to what we mean.

This fall cannot but be due to a very great extent to the restriction of business caused by the tightness of the money market. But for this stringency, we fancy Messrs. Akbar's Mills at Negombo would have continued to work—notwithstanding the sad death of their proprietor. One other establishment at least, not far from Colombo, owned by natives, has been obliged to stop work, owing to the stringency of the money market during the whole of this year. Naturally this has told on the local demand for nuts, of which the working mills took advantage. The resolution of the Orient Mills to have an establishment in the Chilaw district, supplementary to the large and flourishing concern which has existed for several years at Veyangoda, is in imitation of the example of Messrs. Vavasseur & Co., who last year opened a branch establishment in the same great coconut district, where the ruling price for nuts is controlled to a great extent by the cost of transport to the port of shipment. Establishments like those we are considering take count of the lower cost of transport of the manufactured article—the cost of manufacture itself being lighter in the rural districts where labour is cheaper than in Colombo and the neighbourhood. A large proportion of the nuts of the Chilaw district, which found its way to Colombo in the shape of copra, will now go to the two desiccating mills there; and if copra becomes scarcer (and dearer) the reaction must be in favour of nuts which will thus command a higher price! At least such is the hope of the coconut proprietor; while the calculation of the mills is said to be that prices will be easier, when the nuts of one district are not wanted for the manufactories of another. The reasoning would be intelligible if there is to be no advance in the quantity of desiccated coconuts; but so long as the new mills lead to larger exports, there must be keener competition for nuts, and with it better prices. Another fact which should cheer the hearts of coconut proprietors is the purchase of the Akbar Mills at Negombo by the Ceylon Tea Plantations Company. We suggested a couple of years ago, that this flourishing and wealthy Company, which has been investing its reserve in coconut estates, is not likely to be content with disposing of their produce to manufacturers. Its enlistment among manufacturers is to be welcomed by estate proprietors; and if only the demand for oil is fairly maintained, prices for coconuts may rise again to the figures of last year. But the oil market is ever a slippery one; and we would prefer not to prophesy before the event!

CEYLON AND ORIENTAL ESTATES COMPANY.

There is no indication in the Annual Report of the Directors of this Company—given on page 23—of a change of name as recently intimated in a local print. It will be seen that the Report is a full and satisfactory one giving due details as to selling price of tea, exchange, yield, &c., and the latest statistics of each estate as to cultivated area, &c. The dividend declared—aggregating 7 per cent for the year—must be considered satisfactory in view of the strong position taken by the Company with its 4½ per cent debentures. To have the Chairman of the Bank of England on the Board is a great advantage and no less to have Mr. Huntly Thring for Managing Director; while among the Directors are such well-known and esteemed names in Ceylon as Messrs. T. J. Lawrance, Reiss and Hancock. The Company has our best wishes for its continued prosperity.

FREE GRANTS OF LAND OFFERED IN BRITISH NORTH BORNEO FOR PLANTING.

We direct attention to the notice, in the daily issue of the *Ceylon Observer* from the British North Borneo Company, offering free grants of land to young men with a capital of £2,000 and upwards. The grants of land are of 500 acres each suitable for the cultivation of coffee, tea, cinchona, etc. Other lands suitable for tobacco, rhea and Indian rubber can also be had on favourable terms.

PRODUCE AND PLANTING.

LIBERIAN COFFEE.—The production of coffee in Liberia is increasing enormously. The coffee exported during the fiscal year, 1896, amounted to 600,000lb, while the exports for the year ended June 30,1896, amounted to 3,000,00lb. Farmers, merchants, and people generally have turned their attention to

coffee growing. While no American ships touch at any Liberian ports, yet more than one-fifteenth of the coffee produced is shipped to the United States via Liverpool. Coffee is the largest export.

PLANTING IN SALVADOR.—As British capitalists are turning their attention to South America and its planting resources, they might favourably regard Salvador, says a correspondent. It is one of the richest countries in the world, and one of the most densely populated. There are no people of great fortunes like the Vanderbilts and Astors there, but a great many who have large estates that yield handsome incomes. Coffee is, of course, the big industry, and the crop is worth annualy about 7,000,000 dols in gold. There is also a large amount of indigo exported. Almost the entire country is under cultivation. The only drawback to life in Salvador, and we should say it is a very serious one, is the constant dread of the ravage of yellow fever.

THE SPICE TRADE.—Ceylon cinnamon, notwithstanding the liberal supply and diminished delivery, shows a decrease in stock, and quotations are higher than they were a year ago. There are still plenty of cinnamon chips on hand, notwithstanding a decrease in the imports, and the value does not improve. The movements of black pepper at the port of London have been the very opposite to those in 1896, for whilst the landings during the first seveneen weeks of this year have been double what they were in 1896, the deliveries have fallen off by 220 tons, and the present stock exhibits an excess of 1,750 tons; but, strange to say, prices of Singapore and Penang are ¼d to ½d per lb above those in April last. White pepper, however, appears in a healthier position, as although there have been heavier landings, they have been largely outweighed by the quantity delivered, and the stock is 740 tons lighter than in 1896, thus warranting the rise of ¾d to 1d per lb that has been established on the leading sorts.

THE COOLIES OF JAMAICA.—There are about 10,000 Eart Indian labourers (coolies) in Jamaica, some of whom are still indentured upon the estates, and some of whom are now free. They are more intelligent and reliable workmen than the negroes. Without them it is claimed the managers of estates would often be at a loss to get their work done. The pure whites of Jamaica number about 12,000, and are chiefly British colonists and officials and their descendants, with a few hundred Americans.—*H. & C. Mail.* April 30.

NUWARA ELIYA TEA ESTATES COMPANY, LTD.

The first annual general meeting of this Company was held at Winchester House, 50 Old Broad street, on 30th April. Mr. C. A. W. Cameron presided. The Chairman in proposing that the reports and statement of accounts be adopted, stated that the Directors regretted that it was not possible to propose a dividend for the year at a higher rate than 6 per cent, especially as the first six months working allowed of an interim dividend being paid at the rate of 8 per cent per annum. But the rise in exchange, specially during the last six months of the year, the extensions to existing, and the erection of new factories, as also changes in the system of working, all combined to seriously interfere with the proper manufacture of the teas, and further, the later purchased estates were not at once in a position to do their share of profit-earning. However, the Directors were satisfied with the accounts under the circumstances, and hoped that the shareholders would also consider them as satisfactory, especially bearing in mind that nearly £1,000 has been applied out of the year's profits, towards writing off formation, expenses and cost of leases. The estates are now being brought rapidly into thorough order, and improved results are expected for the current year. The crop of tea to 21st April was 324,000 lbs against the estimate from all the estates of 785,000 for the yea, so that prospects were in favour of the estimates being exceeded. Besides the estates of Park, Concordia, Pedro, Larver's Leap, Kenmare and Naseby, and the leases of Fairy Land and Mazewood, the Co., had acquired Court Lodge with Excelsior, and Hillside estates. The area of land under tea was 2,174 acres, besides which about 60 acres, of good forest land was available for tea. The yield from the estates would increase as young tea came into bearing, The amounts *£2162 15s 2d* and *£1,109 2s 1d* would gradually disappear from the Balance sheet, as the Directors proposed apportioning a portion of each year's profits towards their liquidation. In conclusion the Chairman remarked that the carrying through of negociations for the the purchaee of the estates had been a very difficult matter, owing to the great demand for Tea properties in Ceylon, and specially for such estates as those owned by the Company. The board was well satisfied that the Company was possessed of properties than which there were none better in Ceylon, and which should yield steady dividends.—Also that this Company is in a position, owing to the high prices their teas command, to meet possible set backs.

Mr. Oscar Thompson seconded the motion, which was unanimously adopted, and resolutions were afterwards passed declaring a dividend at the rate of 6 per cent. per annum on the ordinary shares; and the re-election of the retiring Directors, and Messrs. Cooper Brothers & Co. as auditors to the Company.

BRAZIL COFFEE NOTES.

A group of coffee plantations in S. Manoel, S. Paulo, belonging to the Queiroz family, has just been sold to a Dutch syndicate for the sum of £500,000. The sale of the Dumont plantations to an English syndicate, of the Queiroz plantations to a Dutch syndicate and the reported sale of another large property to a German syndicate, are significant indications of coming changes. If the government would reduce the tax on transfers, many small properties would also change hands at once, to the great advantage of the conntry.—*Rio News*, April 6.

THE COFFEE SITUATION.

Brazil coffee has dropped to the lowest point since 1886. The decline within one year has reached 6 cents per pound, and is due to increased supplies throughout the world. The full benefit of the lower prices has been given to consnmers, largely through the war between coffee roasters. The result of lower prices is an increased consumption, which, for the first nine months of the trade year, shows an increase over the previous year of 362,163 bags.

The world is absorbing 1,000,000 bags per month and stocks are increasing. The visible supply of the world on January 1st, 1897, was 4,024,968 bags, against 3,552,792 bags at same date last year; on April 1st, 4,181,529 bags, against 2,634,670 bags on April 1st, 1896, an increase in one year of 1,546,859 bags—sufficient reason for a drop in prices.

An era of cheap coffee has been entered upon. Extreme low prices will check new planting enterprises, but we must bear in mind that 1896-97 marks the first tangible results of the last five years' extension of the planting industry.—*American Grocer*, April 14.

CINNAMON AND GRASS.

We direct attention to an extract from the local "Examiner," given on our third page, which affords some curious information. First, it appears that land cultivated with cinnamon near Colombo yields a return from two half-yearly harvests of R16 per acre per annum; while, on the other hand, land cultivated with grass—"Mauritius" or "Guinea"

grass, most likely the former,—within or near the city, gives a return of R8 per month or R96 per annum for each acre! Grass is, therefore, six times more profitable than cinnamon. How are the mighty fallen!

Now, it seems that the Government—or rather the Government Agent, W.P.?—had recently to lease 300 acres of cinnamon and 200 acres grass for a period of five years (1897-1902) and how this was done, can best be learnt from our extract elsewhere. Suffice it to say, that while our contemporary estimates that the cinnamon should yield R24,000 in the five years and grass R96,000 or a total of R120,000, the 500 acres were at first, very nearly leased out for R20,000! But more sagacious counsels prevailed and the offer was raised to R55,000. Still, this is thought to be too low. But that depends. True, on the estimates. R65,000 will remain for the lessee; but what about his looking after 500 acres of cultivation for five years and the risk incurred, year by year, of a failure of crop or failure of market in that time. We scarcely think the margin too great from this point of view.

THE CEYLON & ORIENTAL ESTATES COMPANY, LIMITED.

REPORT OF THE DIRECTORS.

The Directors beg to submit the Audited Accounts for the year 1896.

The Tea crop (including 23,088 lb. made from bought leaf) totalled 1,542,754 lb. against 1,332,142 lb. in the previous year. The average price of the Tea sold in London was 8·07d. per lb., against 8·44d. per lb. in 1895, which depreciation is on a parity with that of the general average of Ceylon. The average exchange for the year was 14·68d. as against 13·56d in 1895.

There has been charged to capital during the year the cost of the half-share of Denegama estate, and a small purchase of land at Keenakelle together with the sum of £1,320 2s 3d for new buildings and machinery, and £2,534 19s 7d for planting and upkeep of new clearings.

Upon renewals and repairs to buildings and machinery the expenditure was £1,125 13s 0d, and this outlay has, as usual, been defrayed out of revenue, while £500 has in addition been written off for depreciation. A liberal expenditure upon manure, considerably in excess of any previous year, has also been charged to the working account, and the full advantage of this has yet to be experienced. The estates have been well kept up in every respect, and according to the most recent reports are looking promising.

To provide funds towards payment of the second half-share of Denegama estate, an issue of £6,000 of 4½ per cent. First Mortgage Debenture Stock was made on the 1st October last. The price obtained for the stock was £103, and the premium thereon has been applied in part payment of the legal expenses and stamp duties attending the conversion of the 6 per cent. Debentures into 4½ per cent. Debenture Stock.

Owing to the higher exchange and a lower market for tea, the profits for the past year are less than in 1895. This deficiency was further increased by reason of the small crop of coffee from the 120 acres still in bearing on Keenakelle estate. The Directors are glad to say that a better revenue is expected from this source in the current year, as also from the increase of crop from the cocoa now coming into bearing.

In pursuance of the policy which the Directors have followed from the beginning, further small clearings of tea will be opened this year—in all about 100 acres.

The balance at credit of Profit and Loss Account, after paying all charges, including Debenture Interest, writing off £437 12s. 11d., the expenses at tending the conversion of the Debentures, and £500 for depreciation of Buildings and Machinery, is £7,831 12s. 4d., and deducting therefrom the Interim Dividends paid in November last, there remains a balance of £4,945 3s 5d., which the Directors recommend be apportioned thus:—

	£	s.	d.
To Reduction of Debenture Issue Expenses Account	£1,250	0	0
To Payment of the Preference Dividend for six months to 31st December 1896 (making 6 per cent. for the year), less tax ..	1,334	0	0
To Payment of an Ordinary Dividend at the rate of 4 per cent. (making 7 per cent. for the year), free of tax	2,210	11	2
To Carry Forward to next Account	150	12	3

The Directors again desire to express their satisfaction with the work done by the Staff in Ceylon.

HUGH CHAPMAN, *Secretary*.

HUGH C. SMITH, *Chairman*.

J. HUNTLEY THRING, *Managing Director*

London, 24th April 1897.

SCHEDULE OF ESTATES.

Name of Estate.	Acreage Tea.	Acreage Coffee	Acreage Cocoa and Coffee.	Acreage Cocoa	Acreage Cocoa and Tea.	Cardamoms.	Forest Waste and Cheena (approximate).	Total Acreage (approximate).
Bogahawatte	541	..	..	..	..	..	77	618
Le Vallon & Rajatalawa	1,216	..	..	..	..	5	2,358	3,579
Denegama..	318	..	..	..	..	..	131	449
Peacock Hill	300	..	..	..	..	..	192	492
Keenakelle (including Serendib and Keenagashena)..	500	120	..	100	40	..	810	1,570
Peradenia ..	424	..	..	..	..	..	747	1,171
Oodewelle ..	442	..	..	..	..	..	953	1,395
Ooragalla ..	320	..	..	..	..	..	129	449
Wiltshire & Hampshire	272	..	..	55	..	..	517	844
Wangie Oya	445	..	..	..	..	..	122	567
Moralioya & Wilton ..	218	..	..	..	..	..	237	455
Pathragalla..	100	..	276	..	30	..	319	725
	5,096	120	276	155	70	5	6,592	12314

CEYLON ASSOCIATION IN LONDON.

REPORT OF THE TEA AND PRODUCE COMMITTEE MAY, 1897.

The Committee has held six meetings during the year.

Special attention has been given to matters in connection with the public sales of tea in Mincing Lane so that the arrangements and conditions of the sales may as far as possible meet the convenience of buyers.

The limits for small breaks were extended to 18 chests, 24 half chests, and 40 boxes, on 1st October last; and these sales have since that date been of sufficient importance to attract buyers of every class.

At one of the large Tuesday sales of Ceylon tea, in October last, some delay was caused by the interposition between the large breaks and small breaks, of a sale of Java teas. On the attention of the Committee of the Tea Brokers' Association of London being called to this, a recommendation was issued by it to Java brokers to endeavour to induce their merchants to issue catalogues for Thursdays only.

In January last a circular was issued by the Tea Brokers' Association of London announcing that, in accordance with a resolution carried at the annual

meeting of the Association and with the concurrence of the London Wholesale Tea Dealers' Association the public sales on Mondays and Tuesdays would begin at 11-30 a.m., instead of 12 noon, on and after 1st February. This circular was quickly followed by a strong protest against the change, addressed to your Committee by twenty-one brokers and dealers, among them many leading men in the trade. The Committee considered the question as one mainly of convenience for those (brokers and dealers) who actually take part in the sales. The proposed change was not made and the Tuesday sales continue to be protracted to a late hour.

Much dissatisfaction has recently been expressed by the Wholesale Tea Dealers at the failure in many cases on the part of importers of Ceylon tea to comply with the requirements of clause 4 of the conditions of public sales, which states that the teas put up for sale have been "inspected" and "bulked (if necessary)." The Committee, having ascertained that the complaint made was not altogether without foundation, issued a circular letter inviting the attention of importers "to the imperative necessity for complying with the conditions of the clause referred to, so that buyers may operate with the fullest confidence in the future."

The Wholesale Tea Dealers' Association has since made a further request that in every catalogue each parcel shall be marked either "bulked in Ceylon," or "inspected and bulked in London."

In dealing with these matters connected with the public tea sales the Committee has been guided by the conviction that the interests of Ceylon producers can best be advanced by giving every possible facility and security to buyers.

Much damage was caused to the teas brought home last summer by the Orient Company's steamers "Austral" and "Cuzco" owing to taint from apples carried in these vessels. Those who had suffered damage appealed to the Committee, who appointed a sub-Committee to deal with the matter. Protracted negotiations ended in a compromise, under which Messrs. Anderson, Anderson & Co., the agents for the Orient Company, agree to settle the various claims by a payment of three-eighths of their amount.

Messrs. Joseph Tetley & Co. brought to the notice of the Committee a case in which the Russian Customs authorities had charged a heavy duty on Acme tea chests entering Russia, as on tinplates, in addition to the duty payable on the tea packed in the chests. The matter was referred by the Committee to the Board of Trade, and a reply has been received from that department from which it would appear that in the case of large packages, such as chests or half-chests, tin casing is not liable to duty.

The Committee has watched with interest the constant increase in the demand for Ceylon teas in countries other than the United Kingdom. Mr. W. MacKenzie has attended several of the meetings and given information as to the progress made in the United States and Canada, while written communications have been received from Mr. M. Rogivue in regard to the growth of the tea trade in Russia, and from Messrs. Joseph Tetley & Co. as to prospects in Switzerland and the South of France. In each case the reports are encouraging.

The prosperity of the Ceylon tea industry has been well maintained during the year, though the profits of 1896 show, in many cases, some falling-off as compared with those of the previous year, owing mainly to the increased value of the rupee.—Local "Times," May 17th.

EASTERN PRODUCE AND ESTATES COMPANY'S MEETING.

The ordinary general meeting of this Company was held at Winchester House, London, E.C., on Wednesday, April 28th.

Mr. C. J. Lindsay Nicholson presided, and said that when he last had the honour of addressing th shareholders he was able to assure them that th Company was prosperous, strong, and well. Today he was able to assure them that the Company was still better and in a stronger and more prosperous position. If they referred to the accounts it would be seen that the Company had some £55,000 to deal with, out of which all interest and liabilities had been paid. From the balance the Directors proposed to pay a dividend of 6½ per cent. for the year, to place £5,000 to the reserve fund, and to carry forward the balance of about £12,000 to provide for the debentures falling due during the year. The Company had expended slightly more on buildings and machinery, and, as was well said by a gentleman in that room last year, there was no inducement not to make good provision for the machinery, and each year they wrote off a good amount for the depreciation of machinery. The produce in hand on December 31st last was £21,495, which had all been realised at a profit. He could not help thinking that the position of the Company at the present time, in comparison with what it was at its commencement, was really surprising. Eight years ago, when the Company was started, they had debentures amounting to £200,000, carrying 6 per cent. interest, whilst at the present time they had only £100,000, at 4½ per cent. interest. The Directors could, if they desired, reduce that rate of interest, but they were more anxious to see the debentures cleared off entirely, and he believed that as time went on the Company would be able to pay off those debentures. At that time they had 8,000 acres of tea estates, whilst at the present time the number of acres under cultivation was 10,535. The reserve fund of the Company amounted at the present moment to £20,000. Eight years ago the average sale price was 1s. per pound, whilst today it was something a little over 7d. per pound. They had had a great deal of anxiety at times, and the success had not been unaccompanied by anxiety. If Ceylon tea was to continue to be prosperous it would be very necessary to keep up the quality of the tea. It was absolutely necessary that that should be done, and so keep them in the first rank to command good prices. It would not do for the Managers to be carried away by a laud boom, because after a boom invariably came a reaction, and they must use all their exertions to the making of good tea. At the present moment their factories and gardens were second to none and their Managers equalled by none.

The report was adopted, and the dividend approved. —*Morning Post.*

TANNING BARK AND ACACIA DECURRENS.—We attract attention to a letter on this subject elsewhere. At the recent Nuwara Eliya Show, Mr. A. J. Kellow exhibited Acacia bark on which he had a most favourable report from Colombo tanners, and a price which did more than cover expenses. But even here, the carriage of heavy bark must be the drawback, and "T" himself has pointed out to us the following paragraph which shows how that dfficulty is overcome in Australia by the bark being "boiled down":—

"The bark of the Australian, 'black wattle' has been shipped from Ceylon experimentally from trees planted six years ago on estates as boundaries and break-winds. Each tree stripped gave 22 lb. dried bark. It is a question whether the value of this bark as a tanning substance will enable a price to be realised sufficient to do more than cover railway and steamer freight. In Australia the cost of carriage from the interior, where no water transport exists, is so heavy that the bark is there boiled down to a thick substance in a highly concentrated form, which of course reduces the cost of freight on the solid tanning principle. Were this system adopted in Ceylon, it might be found to effect a great saving in cost of transport."

Perhaps Mr. Kellow will give a trial to this plan in Ceylon and report the result.

LARGE BRAZILIAN COFFEE PLANTATIONS.

The largest coffee estates in Brazil comprises 110,000 acres of which 13,000 acres are planted with coffee, and 20,000 more are suitable for coffee trees. This plantation was sold to an English syndicate for $5,838,000.

The United States Vice-Consul at Santos furnishes the following statement of the trees in bearing and of the yield and profits from 1892 to 1895 and estimated profit for 1896:

Year.		Coffee trees in bearing.	Yield pounds.	Profit dollars.
1892	..	1,300,000	3,897,600	269,895
1893	..	1,400,000	4,200,000	349,645
1894	..	1,500,000	5,107,000	432,946
1895	..	2,069,700	8,400,000	637,266
1896	..	2,476,500	9,000,000	*711,133

Estimated.

The total number of trees in this plantation was, in June, 1896, 4,426,604, of various ages, including 194,000 planted in October and November, 1895, and it is estimated that two-thirds of the trees being new, from 1897 on an average harvest of 100,000 bags (13,200,000 pounds) may be expected, and that, when all the trees will have arrived at an age of three or four years, the yield may increase to 250,000 bags of coffee, or about 32,500,000 pounds per annum.

The next largest estate is owned by Carlos Schmidt, who arrived in Brazil from Germany some thirty-five years ago. The area of his property is 9,785 acres, with 1,800,000 trees, populated by nine colonies with 260 families, furnishing some 1,500 labourers. There are several other plantations on which grow more than 1,000,000 coffee trees.—*American Grocer*, April.

THE INDIA TEA TRADE.

Reuter informed us yesterday that a motion to reduce the duty on tea to 2d per lb. had been rejected by Parliament by 209 against 95 votes, a result which is not extraordinary, considering that the adoption of the motion would have involved a diminution in the revenue dring the current official year of, roughly, 1½ millions sterling. The present duty on tea imported into the United Kingdom is 4d per lb., and the total imports during 1897-98 are estimated at 270 million lb., which gives £4,500,000 as the amount of the duty to be received. The Chancellor of the Exchequer has estimated for a surplus during the year of £1,569,000, so the reduction of the duty on tea would have swept away all this, as well as a further large sum, assuming, that is, that the estimates were not exceeded. The advocates for the reduction of this duty have been rather too precipitate, and placed their demands too high. If they had moved that the duty should be redued a penny per lb., it is possible that success might have crowned their endeavours to secure this further and important advance towards a "free-breakfast table." The time may come when this will be brought about, but it is not yet. Since 1711, the duty on tea imported into the United Kingdom has been altered very many times. Commencing in the above year at 5s 6d per lb., it continued that figure until 1750 when it was reduced to 3s 4d. In 1760 it was reduced to 3s and to 2s 6d in 1770. In 1780 it was raised to 3s 4d, but in 1790 it was reduced to 7d. In 1800 it was increased to 1s 6d and to 3s 10d in 1810, but in 1820 it was reduced to 3s 2d and at the end of the four following decades the duty was as follows:—2s 6d, 2s 1d, 2s 2d and 1s 6d. In 1870, the duty was reduced to 6d, at which figure it remained until 1890, when it was reduced to the present figure, 4d per lb. As regards the average price of tea per lb. in the United Kingdom, it has fallen from 18s in 1711 to 9⅝d in 1896, while the consumption has risen in the same period from 142,000 lb. to 258,000,000 lb., the record, which will, if the estimates are worked up to, be largely exceeded during the current year.

We have in previous years contrasted the remarkable increase in the production of British-grown teas with the equally remarkable decline in the production of China teas, and the partly estimated returns for 1896-97 show a continuance of the one and the other, for while the former figure at 223,000,000 lb., an increase over the previous year of about 22,000,000 lb., the latter figure at 35,000,000 lb., a decrease of about 6,000,000 lb. The following statement, compiled from Messrs. Geo. White & Co.'s interesting annual report, showing the fluctuations in the production of tea, is instructive:—

		India.	Ceylon.	China.
1875-76 ..	lb.	25,500,000	200	149,000,000
1885-86 ..	,,	67,250,000	5,361,000	143,000,000
1895-96* ..	,,	118,182,000	83,388,000	40,859,000
1897-98* ..	,,	135,000,000	100,000,00	30,000,000

* Estimated.

As regards last year's crop of Indian tea, the quality appears to have been ordinary, with some very choice descriptions in the autumn, and the average price for eight months was 9⅜d, compared with 9d in the same period in 1895 96 and 10⅛d in 1894 95—the Ceylon average for those periods being respectively 8⅜d, 8⅝d and 9¼d. During the current year, no advance in price is anticipated, and Messrs. Geo. White & Co. consider that the tendency is to a lower range, the demand being for a cheap, *i.e.*, low-priced, tea, a large proportion of the imports going into consumption at the retail price of from 1s to 1s 4d per lb., while 1s 6d to 1s 8d is considered a liberal figure for the better descriptions. This being the case, and with a possible higher rate of exchange, this firm regards it as "more than ever a matter of necessity that the sale of British-grown tea should continue to be pushed in countries other than Great Britain with all possible vigour." Much has already been done in this direction, and the shipments of India tea to Australia, to countries in Asia, to America and to the Continent of Europe have increased from 9,406,000 lb. in 1894-95 to 12,648,000 lb in the past year. But this is not sufficient, especially as the exports to the same countries from Ceylon have increased in the same period from 9,091,000 lb. to 14,532,000 lb., the exports of Australia last season having been very nearly double those from India. The great Indian and Ceylon Tea Associations have worked with a will in the past to push sales in new fields, but it is of paramount necessity, as Messrs. George White & Co. remark, that their efforts should be persisted in with even greater stress than heretofore if they do not wish prices to fail, owing to the supply exceeding the demand.

India and Ceylon may again have a formidable competitor in China, where modern machinery and modern systems of manufacture may shortly be introduced. What the ultimate result of this up-to-datedness on the part of China will be, remains, of course, to be seen; but from the opinion which tea-brokers in the United Kingdom have expressed about some of the "new-process" tea from Foochow, the reformed methods of manufacture may exercise a powerful and maleficent influence on the consumption of the British-grown article. From a circular issued by Messrs. F. Cave-Thomas & Co., of Foochow, we learn that Messrs. Andrew Melrose & Co., an old established firm of tea dealers in Edinburgh, have stated that "if John Chinaman sends Home all his tea as strong as this"—a sample of the machine-made tea which had been submitted to them for their opinion—"he will very soon give a good account of himself against the overwhelming flood from India and Ceylon, because there is in this sample much more of what the public consider the style and taste of tea than much of the woodytasted stuff that comes from many of the Indian estates especially." This sample, it appears, was ordinary third-crop Pakling leaf, and it is fondly anticipated by a China paper that first-crop leaf from the leading districts in the Yangtze Valley, prepared according to the new method, would be infinitely superior thereto. A Shanghai firm in, commenting on the enthusiastic manner in which

this "new process" tea from Foochow was received in England and reported upon by leading distributors, states that there is a "strong hungering for *something* in tea which is lacking in Indian, and only partially found in Ceylon produce. This *something* is the 'flower' flavour which only China leaf possesses, and our opinion is confirmed that China leaf made by machinery would be the ideal tea that is wanted. The market is ready for it as soon as it is produced." These no doubt, are the opinions of those whose interests are chiefly centered in China tea; but there can be little doubt, we think, that, given such a strong tea as that referred to, India and Ceylon will have to look to their laurels. However, the time is not yet to despair—there is a peculiar excellence in the British-grown article which will require a deal of beating, and that is, a little goes a very long way, a fact which appeals strongly to the public.

That the method of manufacture in India and Ceylon is not perfect is shown in Messrs. Geo. White & Co.'s report, where they state that "there is still room for the application of science to some of the stages of witnering, fermentation and drying." And in view of the large quantities of leaf that are spoiled for want of knowledge in the details of curing, they repeat the suggestion which they made in 1885, that a specialist should be appointed to experiment with a view to afford information to garden managers in these points. The *Produce Markets Review* has also expressed the opinion that it would amply repay planters to engage the best scientific assistance to study the chemical constituents of the leaf under different conditions of soil, weather and blights, also of the various changes it undergoes in withering, drying, rolling, etc. With reliable information on these points, uniformity of quality throughout the season might be secured, and violent fluctuations in value thereby avoided.—*M.Mail*, May 13.

MISSIONARY COFFEE PLANTATISON.

Bishop Hartzell, of the Methodist Episcopal Church, is now visiting the missionary stations established by Bishop Taylor on the west coast of Africa. In a letter to the New York *Christian Advocate*, Mr. Hartzell says:

"The movement inaugurated by Bishop Taylor ten years ago for a great advance among the native heathen of Liberia will stand out in history as one of the really heroic movements in missionary annals. In ten years fifty stations were opened and eighty-eight missionaries brought from foreign countries, most of them being from America. In the effort toward self-support fully 45,000 coffee trees have been planted, and large expenditures made in the way of stock, fencing, sugar mills, transportation, etc. Of the fifty stations opened twenty-nine are now occupied. Two which had been opened on the east side of the Cavalla River were abandoned because of the French taking the territory. Of the twenty-nine now occupied fully one-half, for lack of workers and means, are doing but little. Of the 45,000—probably 50,000—coffee trees planted, scarcely 15,000 have been saved being choked to death by grass and bushes. American farmers can have no conception of the abundance and rankness with which vines and bushes grow in this country, or with what rapidity buildings will disappear. Leave a well-cultivated farm to itself three or four years, and every vestige of the buildings, except the stones and the few hard native timbers used, will be gone, eaten by insects; and the land will be one mass of vines and bushes, so intertwined and tangled that to pass through them is impossible, except as natives cut the way before you. It requires much labour and expense, as well as business push and judgment open and maintain a coffee farm in Liberia.

"I have visited our best stations, and made diligent inquiry of those in charge of others to find out how much coffee will probably be sold from the twenty-nine stations now occupied this year. The amount will certainly not exceed $200, and half of that from Barraka, our best station."—*American Grocer*, April 14.

THE AMSTERDAM BARK MARKET.

Our Amsterdam correspondent writing on April 27, states that at the Java cinchona-auctions to be held in his city on May 6th, 5,601 bales and 233 cases, weighing in the aggregate 524,362 kilos of bark will be offered. They represent a total of 28,892 kilos of sulphate of quinine, or an average for the Manufacturing bark of 5 60 per cent, which is above the average. The Pharmaceutical bark consists only of 17,255 kilos, representing 486 kilos of quinine. The general position is extremely firm, and it is expected that there will be a very good competition at the sales, and that the unit will again exceed that of the April auctions. Provided the April shipments from Java remain moderate, there will only be sufficient first-hand stock in Amsterdam to provide for small auctions in June and July. At present it would seem that there are only small Java shipments in prospect. The demand for quinine is said to remain very good and rumours are current that the price will again be advanced. The next cocoa-butter auctions will consist of 40 tons of Van Houten's, 10 toos of Hamer's, 10 tons of Dutch factory, and 7 tons of foreign brands. The market is firm, but the demand is small.—*Chemist and Druggist.*

COFFEE MILLS.

Brazil.—Coffee mills have a very wide sale in this country. Formerly they were largely of French origin, but we have now been distanced by Germany, owing not so much to cheapness as to the active way in which the Germans push their trade.—*French Consul at Sao Paulo*, August 30, 1896.

ANNUAL REPORT OF TEA SALES IN MINCING LANE.

A planter writes:—"Messrs. Wilson, Smithett & Company's big list is very interesting reading, but there are evidently several rather large errors of quantity. Could not this be remedied by getting the quantities checked by the selling brokers for the several estates before printing?"—Certainly this ought to be done.

COFFEE.

HAWAIIAN ISLANDS.—Under the provisions of the Land Act, 1895, a large area of Government land has been leased to small holders, with privileges of homesteading and eventual purchase, principally in view of its probable adaptability to the cultivation of coffee. The experiment is still in process, as a year or two more must elapse before any considerable result of systematic planting can receive a fair test.—*British Consul-General at Honolulu.* Nov. 29, 1896.

COPRA.

Zanzibar.—The cultivation of copra is still gradually increasing, the owners of plantations probably finding that, in view of the very small amount of attention that has to be bestowed on the growth of the coconut tree, the increasing scarcity of labour, the absence of any duty on this commodity, and the low price of cloves, the production of copra is as remunerative to them as that of the last named article. France takes practically the whole of the copra produced, a small quantity going to Germany and very little elsewhere. English merchants, who in former times used to transact an extensive business in this direction, state that they cannot attempt to compete with the prices that are now readily paid by French and German houses.—*British Consul at Zanzibar*, May 23, 1896.

THE SPIRITS of Cinchona Planters must be rising. Since February the price of the bark has gone up about 45 per cent.—*Pioneer.*

THE CINNAMON GARDENS LEASE 1897—1902.

A HINT TO THE GOVERNMENT.

The mistake that Government may make in sanctioning leases of Crown lands with only imperfect and untrustworthy information to go upon was never better illustrated than in a recent instance when it was asked to part with some six hundred acres of land in the Cinnamon Gardens, in the Colombo district of the Western Province for R20,000 for five years from March 1897. The Government it seems was almost persuaded to approve of the offer; but most fortunately it resolved to call for tenders; with the result that, instead of R 20,000 it secured R 55,000 an increase of R 35,000. We learn that had notice of this sale been published in the local papers, and had the lands been properly described as being partly under grass and partly under cinnamon, and definite information given as to the acreage under each instead of the lands being vaguely called "cinnamon lands," the price they would have realised would have been not R55,000 but over R100,000. From information which has reached us, the value of the lease for 5 years appears to be nearer R120,000. The nett return from an acre of grass or cinnamon land it is well-known is be ween R8 and R10; the only difference is that in the case of grass the return is a monthly one, and that in the case of cinnamon it is half-yearly. This being so, and taking the acreage under grass and cinnamon at the figures reported to us, namely 200 and 300 acres respectively, the *nett* profit from 200 acres of grass at R8 per month for five years amounts to R96,000, and the nett profit from 300 acres cinnamon at R8 per acre, as the cutting is half-yearly, amounts to R24,000 making a total of R120,000. In the face of these facts what shall we say of the private offer made to Government of R20,000 for 5 years which it narrowly escaped accepting? In this connection we should like to know why no stress was laid by Government when it called for tenders, on the important fact that half the area of the "so-called Cinnamon Gardens" is now, and has been for years past, under grass. Fortunately grass has proved a good substitute for cinnamon, and it is well that it is so; but it is to be regretted that the Government and the public were not aware of it earlier, or both would have benefited. Evidently it was to the advantage of interested parties to keep this information to themselves. Surely these valuable lands should not have been disposed of in this careless fashion. We cannot help thinking that it would have been greatly to the interest of Government if, before it completed the lease even on tenders it had called for a special report from the Mudaliyar in whose division these lands are situated. Government might then have been in a position to place a reserve price on the lease, and got at least R100,000 instead of R55,000. We hope when these lands are next put up for sale, that not only will this officer be consulted; but that the Government will be in a position to tell the public the exact extent of land under grass cultivation and the exact acreage under cinnamon. These lands were orginally all under cinnamon, and the price of cinnamon being subject to fluctuations, they were not much in demand. The case is quite diffrent now. Owing to half the acreage being at present under grass, they are now worth 10 times what they were worth 10 years ago. We wonder who is responsible for not pointing this out. We hope Government may be more fortunate at its next sale, and that it will take every precaution in time to find out as closely as possible what these lands are worth without disposing of them in an offhand manner and summarily by tenders as was done with the lease for 1897-1902. We would suggest that, instead of waiting till the lease expires in 1902, the Government should at once appoint a strong Commission consisting of say the Hon. the Auditor-General and the Hon. the Acting Government Agent of the Western Province to find out what this lease is *now actually worth*, so that it may be in a better position to deal with this matter when it come for disposal in 1902. One reason, we are informed, why people were unwilling to tender for the current lease was that they feared that they would be harassed after they had secured the lease, as were the parties who cleared the 200 acres of cinnamon now under grass, and be involved in endless and expensive litigation.—Local "Examiner" May 18.

THE AMERICAN PEOPLE AND GOOD TEA.

The American people are congratulating themselves that, under their new tea regulations at the Customs, they have seen the last of "cheap and nasty teas." The American *Grocer* of April 27th says :—

"If the recommendations of the commission are adopted we shall have few, if any, Pingsuey teas; neither will we have any more of those low-grade Amoy Oolongs which have perplexed this market for years. The displacement of China tea in the United Kingdom by Ceylon and India teas stimulated the importation of trash into the United States. We believe that the high standards adopted will result in an increased consumption and that they will also tend to improve the manufacture of the leaf both in China and Japan. The following standards are established :—

No. 1—Formosa Oolong; No. 2—Foochow Oolong; No. 3—Amoy Oolang; No. 4—North China Congou; No. 5—South China Congo; No. 6—India tea; and No. 7—Ceylon tea.

(In each of the above standards the maximum percentage of dust and fannings must be restricted to 10 per cent when sifted through a No. 16 sieve, inasmuch as any excess over this percentage of dust and fannings is liable to be made up of extraneous matter.)

No. 8—Pingsuey green tea. (As this standard is of better make or style than was necessary to represent the quality of infusion, the rule must be specially emphasized to examine with reference to liquor and infused leaf only.)

No. 9—(*a*) Country green tea; No. 10—(*b*) Country green tea; No. 11—Japan tea, pan-fired; No. 12—Japan tea, sun-dried; and No. 13—Japan tea, basket-fired.

(Dust and fannings in last three standards not to exceed 40 per cent.)

No. 14—Japan tea, dust or fannings; No. 15—Scented Orange Pekoe; and No. 16—Capers.

It is understood that the comparison of the standards with teas delivered must be made upon the drawing of the tea as well as the appearance of the leaf after infusion, and that little or no consideration will be given to the make or style or colour of the teas in the dry leaf."

We trust Colombo shippers will take very great care not to incur censure or rejection for any of their teas at the hands of the American Commissioners; for, the fact would be notified far and wide, and do Ceylon teas great harm. Twice has Ceylon tea—no doubt from native gardens—been rejected at Melbourne as "unfit for human food," and we do not want the same thing to happen at New York. One of the Commissioners, Mr. Phelan, has been remarking :—

Although the world has drunk tea for ages, very little is known about it by the average consumer. For instance, there is a popular superstition that green tea is prepared on copper, from which it derives a deleterious flavor. This is erroneous. Green tea is prepared like all other teas; although there is a minute quantity of coloring matter used to give to its peculiar shade, it is composed of a harmless substance, and in

so small a quantity that one or two teaspoonfuls will color a whole package. All the prejudice which heretofore has existed against deleterious mixtures in teas will hold good no longer, as every leaf imported is guaranteed to be pure, and there is not article of merchandise produced in our own country which can be mixed with it without transforming its character.

And then we have the following statement from the editor:—

It is interesting to note how the various sections of our country adhere to their different teas. For instance, New York City and Boston take almost exclusively Oolong teas, and as the Amoy teas, which are the lowest grade, will probably be excluded largely under the new law, these cities will obtain Formosa Oolong principally in the future. The Eastern States are likewise consumers of Oolong tea, whereas in the Northwest covering Minnesota, Michigan, Iowa, and Wisconsin, the consumption is exclusively of Japan tea. Twenty-five years ago these same States took exclusively green tea, but owing to the greater uniformity of Japan tea, have gradually preferred it to any other. The Middle States, such as Missouri, Indiana, Illinois and Ohio, are large consumers still of green teas, using principally Gunpowders, Imperials and Young Hysons. Likewise, the Southern States, with this difference, that in the South the consumption of tea is almost nominal, the whole South not taking as much as New York State alone. Congou tea is used principally by more recent emigrants and also by the descendants of the English and Irish races. This was the tea used in England for many generations exclusively, and recently supplanted by India and Ceylon tea, which are similar to Congou, or English breakfast teas in flavour. Therefore, while it is taken as a substitute for the latter in England, Ireland and Scotland, it moves much more slowly in our country, as we have never been consumers of that description of tea to any extent, being described by most Americans as "weedy" in flavor. It is a remarkable fact that while Russia has a very heavy duty on tea of over 40 cents a pound, she consumes the choicest Congou in the world' to the exclusion of all other kinds of tea. Hence these teas are frequently called "Russian," and obtain an indefinite *ec at* in this country from the unitiated. There is a duty of 8 cents per pound in England, but none whatever in America. Hence our tea is the lowest in price in the world, and hereafter will be the best in average quality.

It ought to be brought home to our American cousins that the Australians, who are the largest consumers per head of tea (chiefly Ceylon and Indian) in the world, are also among the most athletic, excelling in cricket, riding, and other physical exercises; and indeed our American friends have yet fully to understand that the properties of coffee (which they consume so largely) and of tea are, in the last resort, very much alike.

A GEOLOGICAL SURVEY OF CEYLON.

Fully twenty years have elapsed since we first pressed this very desirable work on the Government of Ceylon. Sir Wm. Gregory and Sir Arthur Gordon most fully acknowledged its importance; but each procrastinated until the end of his term of government was upon him. We trust better fortune is to attend Sir West Ridgeway who, we feel sure, from his knowledge of the great value, in an economic point of view, of the Geological Survey of India, must feel the special need of such an investigation in Ceylon. Mr. W. King, brother of the Government Agent for the North-Western Province, and who rose to be head of the Geological Survey in India before his retirement, was very eager, after several visits to the island, about a Ceylon Survey, and thought it could be managed by one or two officers lent by the Indian Government, at no great expense or loss of time. The conditions in Ceylon over large districts make a Geological Survey comparatively easy. Nevertheless, our Governor may plead that he cannot face a Cadastral and Geological Survey at the same time; and yet the later is a far simpler and cheaper business. On the other hand, we learn from reviews of the India Geological Surveyors' Report for 1896—*which must have been published early in March*—that the Indian Staff is at present shorthanded. Owing to retirements, furloughs, etc, there were only six officers available for the whole of India. But, we suspect if it were made known that the Ceylon Government wished to borrow a couple of Geological officers, men on furlough would gladly come forward on the chance of a spell in this interesting and comparatively healthy island. Be that as it may, it is quite evident that a Geological Survey of the colony ought to be no longer delayed. The great industry in plumbago alone—our one mineral so far of commercial importance—more than justifies such a Survey. The exports of plumbago have developed as follows:— 1850, 28,823 cwt.; 1860, 75,660 cwt.; 1870, 85,249 cwt.; 1880, 205,738 cwt; 1890, 392,577 cwt.; and 1895, 326,754 cwt. But the exploiting of plumbago deposits is done entirely by the Sinhalese without any scientific guidance. No one knows how great may be the rich deposits that a Geological Survey might bring to light within certain untouched areas, and as the Ceylon Government draws a royalty of R5 on every ton exported, it has a most practical and direct interest in extending the industry. Secondly, there are gem deposits famous from the time of Solomon; yet never surveyed nor mapped out, though one or two localities have been examined and reported on most favourably by English experts. With the new patented machine of Mr. Lockhart, which we saw tested in London, we cannot see why there should not be a great development of gemming under European capital, if only the proper tracts of country on which to operate were authoritatively pointed out. Here again the Government, through licenses and leases, ought to get its full share of revenue. This may be said to belong more particularly to a Mineralogical Survey; but a Geologist with Indian experience would be sure to know a great deal about Mineralogy.

Still, a third incentive to commence a Geological Survey at an early date is found in the value of the iron ore deposits scattered throughout Ceylon. Dr. Davy, brother of Sir Humphry Davy, found the ore in the Kandyan provinces to be so rich in iron as to yield 70 and even 90 per cent; and we have most of us seen the remains of Sinhalese smelting places notably in and about Nuwara Eliya. But it is in the Sabaragamuwa and Balangoda districts that commercial importance may be attached to our iron deposits, if it be true, as reported by Dr. Gygax more than fifty years ago:—

"The varieties of iron met with are six in number: viz., magnetic iron ore, titanate of iron, chromate of iron, iron with manganese, iron pyrites, and yellow hydrate and red peroxide of iron. The iron, however, in most of these is scanty, and the ore of little value except to extract the chromo and manganese. But there is another description of ore found in vast abundance, brown, compact, generally in the state of car-

bonate, though still blnded with a little chrome, and often with molybdena. This occurs in large masses and veins, one of which I believe extends for a distance of 15 miles. Of this, millions of tons might be smelted, and when found near water-carriage and fuel it may be worked to a profit. I would lay particular stress on the very fine quality of the iron ore found in Ceylon, it is easily smelted, and so pure when reduced, as to resemble silver. The rough ore produces from 30 to 75 per cent—on an average fully 50 per cent the iron wrought from it requires no puddling, and steel thus made cuts glass like a diamond.'

It appears that Spain is rapidly getting poorer in iron ores, and we were assured in London that if Ceylon ores lay within easy reach of a navigable stream, it would pay to carry the same to London or Glasgow—freight being so very cheap—there to have it smelted and manufactured.

We think we have said enough to make out our case for a "Geological Survey." It ought not to be expensive or tedious; it ought to be directly remunerative; and it ought to be the means of extending old and developing new industries—and industries too, of an eminently desirable character in a country hitherto so dependent on its Agriculture and Planting—with their varying fortunes—as is Ceylon.

SCIENCE AND PRACTICE: PLANTING AND ENTOMOLOGY:

THE WORK OF MR. KŒBELE, ENTOMOLOGIST, IN HAWAII—AND HOW FAR IT BEARS ON PLANTING IN CEYLON.

A recent number of that very useful publication, the Hawaian "Planters' Monthly," contained a special Report on his work as Entomologist, from Mr. Albert Kœbele. It is long and technical, and may be deemed too dry and scientific for perusal by the general reader; but we have reproduced it in our daily and *Tropical Agriculturist* for the benefit of our planting community. There are not a few thoughtful planters, we ar. glad to say, still in the island and to them the account of Mr. Kœbele's work among the "poochies" and other enemies of planting and agricultural industries, will not be uninteresting. Hawaii is as great a paradise for insect and fungoid life as is Ceylon; but there are striking differences, because we find Mr. Kœbele endeavouring to introduce such enemies of insects as rats, bats and toads. And without success, too, in the early trials, as regards the first and second, though there is hope that the batrachian introductions may get on. Now, we need scarcely say that there is no lack in Ceylon of such enemies of insects as are above detailed. Indeed rats were at one time a great enemy of the coffee-planter in certain districts. When their food in the jungle—the *nillu* plant for instance—failed them, rats sometimes invaded the nearest coffee plantation and nipped off the primaries or secondaries of the bushes, thus inflicting a terrible loss on the owner. Such experiences however—as indeed, alas, coffee itself almost—are things of the past in Ceylon; for, we have not heard of a single case in which rats have attacked our later staple product, tea.

We naturally referred Mr. Kœbele's Report to Mr. E. E. Green, who has been good enough to supply us with a series of "Notes" pointing out the portions, and the enemies, which have a direct interest to Ceylon planters. This we append as an admirable summary for local use of the full Report. But, before doing so, we may quote from a very interesting letter accompanying "the Notes," which has remained by us too long:—

Eton, Punduloya, 19th April.—I return your copy of "The Hawaiian Planters Monthly," containing the Report of the Government Entomologist (Mr. Albert Kœbele). This whole Report goes to show what can be done by an intelligent man—with a knowledge of his subject—who can give his whole attention to the work. Not that everyone would have succeeded as admirably as did Mr. Kœbele. He seems to have been the man most exactly fitted to the task.

It may be said by sceptics that this glowing account of his success is merely the man's own testimony. But there is ample outside witness to the value of his work. In a recent number of "Nature" (25th March '97,) Mr. R. C. L. Perkins—the Naturalist deputed by a Committee of the Royal Society and British Association to investigate the Fauna of the Sandwich Islands—speaks in th[illegible] praise of the results of the introduction of be[illegible] their insects into the Hawaiian Islands.

I have just received a letter from Mr. Kœbele himself in reply to my question as to whether he would be in a position and willing to undertake a similar work in Ceylon.

It appears that the Madras Government has also approached Mr. Kœbele on the subject.

With respect to Ceylon, Mr. Kœbele writes:—"If the Ceylon people should want me, my services would be required in India also . . . . It would suit me to introduce all enemies I know of for any scale pests you may have in the respective places. I could do it—alone—in about two, at longest three years. I may be able to come at the beginning of next year if so desired—not permanently, but only for the time stated."

Mr. Kœbele does not answer my enquiries as to the cost of the undertaking and the remuneration for his services. I am writing again to ask for some estimate. In one respect I think Mr. Kœbele misunderstands the position. We do not require such a general and varied introduction of different species as has been carried out in the Hawaiian Islands, covering a long period and occupying the continued attention of the specialist. All we want at present is to see the one or two species of lady-bird beetles that are most likely to help us against our dominant pest ('green bug', *Lecanium viride*), properly established in Ceylon. This could certainly be effected within a very much shorter time than that suggested by Mr. Kœbele. As I mentioned in one of my former letters, I do not advocate any very extravagant outlay in the experiment. I am now of opinion that the decay of coffee was not by any means entirely or even mainly due to the ravages of the bug, though the bug hastened the downfall by sapping the system of the trees already weakened by other—more deeply seated—causes, of which leaf-disease was the prime factor, backed up by a reckless waste of surface soil.—E. E. GREEN.

We quite agree with Mr. Green that Mr. Kœbele takes an exaggerated view of what is required in Ceylon, and indeed he must learn that the cultivation of "Coffee" has been so reduced in area in Ceylon—only a few fields in a few districts being left amidst the universal "tea,"—that the support available for the introduction of the enemy of "green bug," is very limited. The same may be said of Southern India: only in Coorg and Mysore is there an appreciable quantity of coffee left. Our proposal was that the planters of Southern India and Ceylon should unite, getting aid from their Governments, in making up a suitable fee and the necessary expenses for Mr. Kœbele. If his mission proved successful with us, it is very likely that further profitable commissions might await him, especially from Java, Sumatra, and the Straits Settlements. But he must know

that nowhere in the East is coffee, "king now-a-days.

The practical "Notes" with a local bearing, supplied by Mr. Green on Mr. Kœbele's Report, are as follows :—

NOTES UPON THE REPORT OF THE ENTOMOLOGIST OF THE HAWAIIAN GOVERNMENT.

1. *Dactylopius ceriferus.*—Not uncommon in Ceylon; usually in insufficient numbers to be serious. But I have quite recently noticed a really bad attack of this blight in Colombo, where the insect was so abundant on several ornamental shrubs that the plants were quite disfigured and parts of them actually killed.

2. *Dactylopius adonidum.*—Though it is doubtful if the species has been rightly determined (I believe its correct name to be *Dactylopius citri*); this is the "mealy-bug" long known as a coffee pest in Ceylon.

3. *Pulvinaria psidii.*—Very abundant in Ceylon. It has seemed to me to have considerably extended its range within the last few years. I first noticed the pest to [illegible] ten years ago upon cinchona. I next found [illegible] established upon tea; and I constantly find it now upon individual tea bushes which are completely blackened by the accompanying growth of fungus. Fortunately, it does not spread much upon tea. The species is almost constantly present upon guava trees. Orange and lime trees are much subject to its attacks. I could give a long list of ornamental shrubs in the garden and wild plants and jungle trees upon which I have noticed the pest. At present some Aralia plants in my garden are literally covered with the insects. In fact, the species is fast becoming omnivorous. Curiously enough the coffee plant, which is so badly affected by this pest in the Sandwich Islands, is one of the few Ceylon plants upon which I have *not* found the insect.

4. *Lecanium acuminatum.*—Under this name Mr. Kœbele is referring to a largish triangular flat scale that is sometimes rather injuriously abundant upon mango trees in Ceylon.

5. *Aspidiotus aurantii.*—Present in Ceylon; but not so far noticed in injurious numbers. Our climate appears to be too tropical for its comfort. As Mr. Kœbele points out, the species flourishes better in more temperate latitudes.

6. *Aspidiotus cydoniæ.*—Common on many different plants, especially upon fruit trees of various sorts, where it seems to appreciate the fruit itself. I have seen the rind of a pomelo fruit so thickly encrusted with the scales that the natural surface was completely obscured.

7. *Aspidiotus camelliæ.*—A common and distinctly injurious pest upon tea and cinchona in Ceylon.

8. *Parlatoria zizyphi*, and *P. pergandei*—It is surprising that neither of these two species has yet been recorded from Ceylon. They are both very common pests of orange trees and have been introduced into most countries where oranges are grown, being very easily imported upon the rind of the fruit. We probably owe our immunity to the fact that we rest content with the old original varieties that have been cultivated here from the earliest times, without attempting to improve the strain by the importation of plants or seed from other countries.

9. *Mytilaspis citricola.*—Common on orange trees in Ceylon.

10. *M. gloverii*—Collected from orange trees in Kandy.

11. *M. pallida.*—Common on several wild shrubs in Ceylon. Found also occasionally upon guava trees.

12. *M. pomorum.*—The only living examples of this insect that I have seen in Ceylon were upon the rind of imported Tasmanian apples. In England the species has become almost omnivorous. The species does not appear to flourish in the tropics.

13. *Chionaspis biclavis.*—This species is nearly always present often in injurious numbers—upon the stems of cinchona and tea plants. It is a very inconspicuous insect and escapes general observation from the fact that the colour and texture of the scale is wonderfully adapted to the surface upon which it rests.

14. *C. eugeniæ.*—Some scale insects found upon Litzea zeylanica and several other jungle trees were determined by Mr. Maskell as varieties of his species *C eugeniæ.* It is not a species that is likely to prove of economic importance.

15. *Diaspis amygdali.*—Very abundant on many trees and plants in Ceylon. It is a common pest of geranium plants—(see 'Coccidæ of Ceylon', part I. p. 68.)—I have lately noticed that it has established itself upon the stems of one of our common shade trees, the 'Dadap' (Erythrina sp.)

16. *Fiorinia camelliæ* (= F. fioriniæ).—This species has been noticed upon tea in Ceylon this year for the first time. It is a minute insect, and though present in considerable numbers, it does not seem at present to have materially affected the health of the plants.

17. *Ceroplastes rubens.*—Occasionally present upon tea.

18. *C. floridensis* is also found (rather commonly) upon tea and other plants; but does little or no harm.

19. *C. ceriferus.*—Quite a large species, measuring sometimes nearly half-an-inch in diameter; common upon many wild plants; and occasionally present upon tea stems. The insect produces such masses of waxy matter that experiments have been made to test its economic value. The wax was found to contain too much water to make good candles (they spluttered uncomfortably when burning); but this defect could doubtless be rectified by proper treatment.

20. *Lecanium coffeæ*—Once our principal coffee pest is now quite in the background, having been ousted by the more dominant species *L. viride.* It has transferred its attentions to tea and is sometimes found in force upon individual trees, generally such as are under the shelter of some overhanging rock.

21. *L. longulum.*—A decided pest of some of our most valuable shade trees. I have found it upon the 'sau' tree (albizzia) and very commonly upon grevilleas—often in such numbers as to stunt the plant.

22. *L. nigrum.*—Another quondam coffee pest, now seldom found upon that plant, but occurring abundantly upon many wild trees and shrubs, and also upon several garden plants, more particularly upon begonias.

23. *L. tessellatum.*—A widely spread species in Ceylon. It is often very abundant upon the fronds of the 'kitul' palm (caryota urens). I noticed it in the Palm House at Kew Gardens upon the same palm and found several of the gardeners engaged in picking off and destroying the scales.

24. *Triococcus araneariæ.*—When I was at the Hakgala Gardens some few years ago, several 'Norfolk Island Pines' (araucaria excelsa) were badly infested by this species. The presence of the pest was noticeable at some distance by the unsightly black fungus that followed the attack. The trees were greatly disfigured, and I believe ultimately seriously injured.

25. *Rhizobius ventralis.*—Of the 'lady-bird" beetles, this is the species that seems most promising. It feeds principally upon that particular group of scale insects known as the *Lecaniidæ*, of which our *Lec. viride* is a prominent member. This bug being a soft-bodied insect it is particularly open to attack from 'lady-bird' beetles.

I am sorry to note that several of our indigenous "lady-birds" are retiring before the advance of a very pertinaceous little ant (*Cremastogaster dohrni*). This insect is particularly fond of the sweet excretion from the bugs and frequents the buggy trees. As they distinctly encourage the bug, they naturally discourage any interference from predaceous insects, and that the discouragement can be most effective, can be readily proved by disturbing one of their nests. The occupants swarm out upon the intruder and give him a very unpleasant reception. These ants build large nests that have the appearance of being composed of masticated brown paper.

26. The Japanese beetle,—or rather its larva—is evidently allied to the insect formerly known in Ceylon as "White Grub." Mr. Kœbele was most fortunate in finding such an efficacious remedy as the fungoid disease described on page 83 of this Report.

E. E. GREEN,

Pundaluoya, April '97.

PROF. ALBERT KOEBELE AND HIS WORK AS ENTOMOLOGIST IN HAWAII.

(*From the Hawaian "Planter's Monthly.*")

ALAMEDA, California, Dec. 31, 1896.

SIR,—I herewith submit a report of work done since my appointment as Entomologist.—A general account of the conditions of the injurious insects, and the natural enemies introduced from those countries visited. My sincere thanks are due to you for the deep interests taken in the important work, for receiving and liberating the various predaceous and beneficial insects so promptly on their arrival, without such help the results would not have terminated so successfully. We have accomplished what had been desired, namely—the eradication of the worst blight or scale plague that ever appeared in any country. Once more, I consider my duty in the interest of your fair Islands, by any and all means, to prohibit the importation of any soil from all countries, and herewith avoid what in the future could never be remedied,—an everlasting plague of Scarabaeids that would devastate the Islands.

The one species so far introduced from Japan in soil, Adoretus, umbrosus, F., has partly shown what the beetles may accomplish. Fortunately the larva of the same is not injurious, and it is chiefly in the larva form that these insects do the most damage by devouring the living roots of mostly all plant life. We have records countries where those larva do damage. The May beetle or Cockfaer of Europe has cost the various countries untold fortunes for centuries past. Asia, India, Australia and America suffer likewise from effects of these beetles, all this in countries where the respective insects have their natural enemies in sufficient quantities to keep them in check to a certain extent. If any of the hundreds of species were introduced in the Islands, their effects upon plant life would be most disastrous, with no enemies present, and a continuous warm climate, where we could expect at least four broods of the beetle to one in a temperate clime. I doubt that Adoretus has more than one brood per year in Japan, where it is rare, and yet I have bred it in Honolulu from egg to maturity in seven weeks.

But little more can be presented in regard to the introduction of injurious scale insects. There are but very few serious species not yet represented in the Islands from those ports from which plants generally arrive. We can see those and know pretty well how to deal with and where to find their proper enemies. *Aspidiotus fiscus*, Comstock, is found upon very many plants and usually considered one of the worst scales was not yet met with, although it may be present since it is common in Japan and China upon nearly all plants, and must have been brought into Honolulu repeatedly. Even this need not to be feared much, as we have the most effective enemies for the same already present.

Chionapis Citri, Comstock, is another scale affecting citrus trees, apparently not yet present. We have fungoid diseases established upon the Lecanidæ on the Islands, and hope for the same success with the Diaspidinae as well.

The various cut worms, the Ponallo; the Aleurodes on coffee; Phoeciloptera, likewise attacking this and many other plants, and various enemies, still affecting the sugar cane will receive immediate attention by judiciously selecting and introducing predaceous and parasitic insects for the same.—Respectfully, ALBERT KOEBELE.

Mr. J. MARSDEN,
Commissioner of Agriculture and Forestry.

REPORT OF THE ENTOMOLOGIST OF THE HAWAIIAN GOVERNMENT

As you are well aware my first and chief work had to be directed against the numerous scale insects at the time infesting and destroying many of the valuable fruit, ornamental and shade trees. Up to the present time, some sixty species of these have been found on the Islands, and some of them would have made it utterly impossible to raise the citrus and coffee trees successfully. In fact, most of the shrubs and trees at the time were so infested by the then recently introduced and most pernicious coccids ever met with, Dactylopius vastator, Mask, that their destruction in the near future seemed imminent had not relief been brought. Without doubt their destructive work would have spread over all the Islands, notwithstanding the most deligent prevention on your part. The scale has not been met with as yet in any of the other Islands, and at present wherever it may appear, its enemies are awaiting it, the chief of which no doubt is the Australian Lady bird, Chryptolaemus montrouzieri, Mulsant. The coccid is a native of China where it had been met with in the neighbourhood of Hongkong.

Another numerous scale, and one that had longer been introduced than the previous species, *Dactylopius ceriferus*, Newstead, had always been seen covering the leguminous trees often to such an extent that many of them lost their entire leaves and in some instances even were destroyed entirely by the quantities of Mealy bugs present. This species also is kept in check by the Chryptolaemus beetles, which increase to such an extent in the early summer that millions of their larvae can frequently be seen crawling around where the coccids abound. Often this very beneficial insect, for it is always in larval state where they do the most execution, are taken for so-called (blights) and are in consequence destroyed. It should always be borne in mind that the scale insects or blight are generally stationary *i. e.*, fixed to the branches and twigs of plants, very rarely move about, and then only very slow; the Chryptolaemus larva on the contrary is quite active, and when full grown is about a quarter of an inch in length, covered above with six rows of contiguous elongated white mealy secreted appendages. It is then that they can be seen in such numbers that often the fences and walls are covered, the trunks and limbs of trees bear patches of the pupae, often several feet in length. The insect was met with in tropical Australia, New Caledonia, Fiji, Ceylon and Southern China, and will apparently live out of doors in the tropics only.

Another Dactylopius has occasioned great inconvenience in the cane fields, known as D. chalceolariae, Maskell. Here also the Chryptolaemus beetle appeared, and waged war upon the same with the consequence that at present time the pest has also practically disappeared. This scale was met with in Fiji and tropical Australia.

Dactylopius adonidum, Linnaeus, has been present upon most all plants. It is this scale that has marred the coffee industry in the Islands ever since the attempt was made to grow the tree o er fifty years since, by its large numbers sitting around and sucking out the sap of the young berries, producing a premature coloring and dropping of the same. It likewise lives upon the roots of coffee and many other trees and plants in the tropics all over the world, whilst in colder countries it is found upon greenhouse plants chiefly. The injury to the various vegetation formerly caused by the foregoing and many other species of Dactylopius present on the Islands, is now practically done away with. We have sufficient enemies present for them for all time to come.

Pulvinaria psidii, Maskell, another introduction from the Orient, had spread considerably over the Islands, and caused some anxiety, especially in the coffee districts. I myself must confess that nowhere have I ever seen a landscape so completely blackened by the fungoid growth, caused by the honey exudation of the Pulvinaria scale in which this grows, as that of North Kona on my visit in February, 1894. On my recent trip to the same place, all these had changed, and the district, to me, had the appearance of another country, all owing to the presence of the Chyptolaemus beetle that devours the eggs of the scale. Since then various

other species of lady birds were sent there, and still more will be sent, all of such that will prey both upon the eggs and mature insects.

The rose apple, Eugenia malaccensis was still found covered by the black fungus. Here another tropical scale, Lecanium acumiuatum, Signoret, is present in large numbers upon which the Chryptolaemus beetle will not feed, yet many other lady birds have been sent that will feed on this and all species of Lecanium. The above scales have so far been the most numerous and destructive, yet other forms as well have been on the increase and I can give a short account of some of them only, as many of the species are not yet worked up.

Aspidiotus aurantii, Maskell, is injurious to citrus trees chiefly in temperate zones and may have come upon those trees from any port in California, Australia, China, or Japan. It was found upon recently introduced Potocarpus plants from Japan. The climate of Honolulu appears not to be suitable for the same as it was not met with in the tropics as injurious to citrus plants. At Sydney it was found upon Perea carolinensis, Laurus nobilis; Brisbane, numerous upon Jasminum; at Rockhamsden on wild fig tree; Cairns, cultivated figs and Morussp. In Ceylon on Agave (Green); Hong Kong on Paliurus ramosissimus; Litsea sebifera, Hedyotis acutangulus, (very numerous) Stillingia sebifera; on Melia azedarach at Amoy, Swatow, Hong Kong, Formosa and Honolulu; Japan on Potocarpus and Damara like trees, also many other plants. One Chalcid parasite Aspidaphagus citrinus, Craw, is preying on the same in China, Japan and California.

Aspidotus cydoniæ, Comstock, was found on a garden plant at Pahia, Maui, and upon Ake at Honolulu.

Aspidiotus longsipina, Morgan, iufests trunks and branches of Orange, Lemon Mango, Kukui tree, Figs, Pride of India, etc., on all the islands and even a common weed at Lihue, Kauai. The scale was found at Tamsui, Formosa, on Orange and upon Fig trees at Hong Kong. A large number of the scales are punctured with holes from where a minute Chalcid parasite has issued that keeps the scales in the Islands in check.

Aspidiotus duplex has been repeatedly introduced on Camellia from Japan where it also is found upon the tea and other plant it has as yet not become injurious on the Islands.

At Makaweli, Kauai, *Aspidiotus camelliae* and A. nerii were found upon imported American apple, pear and peach trees in such numbers that some of the trees had died. A number of other species of Aspidiotus were met with in the Island, all of them introduced.

Of *Parlatoria*, *P. zizyphi* is the most numerous upon Citrus and another tree at Honolulu. *P. pergandei* is as yet not so numerous. The first was found at Hong Kong and Canton infesting Citrus trees, and the second upon Euonymus at Yokohama and on Camellia at Maceo. Mytilaspis citricola, Packard, is the scale at present found so numerous upon citrus trees at Honolulu, where it had spread within two years. A number of introduced lady birds are preying on the same, and as far as my observations go, I believe that in time they will effectually keep the same in check. The scale also infests Croton and other plants. It is common most everywhere in the world. It is found in the Kona (Hawaii) district but not numerous. *Mytilaspis gloverii*, Packard, has at present only been met with in a citrus tree in Mr. Jordan's yard. The tree had been imported from Japan or China where the coccid is numerous, and with the foregoing one of the most destructive to citrus plants.

Mytilaspis pallida, Green, has been found upon imported Japanese Potocarpus plants. Mytilaspis flava, Targioni Tozzetti was met with upon bark of various shade trees at Makaweli, Kauai, and in China upon Pyrus sinensis (Hong Kong.) *Mytilaspis pomorum*, Bouche, the apple bark louse, was also found on imported American plants.

At Makaweli, Kauai. Diaspis rosae, Sandberg, is the common rose scale and is found all over the world. Diaspis boisduvalii, Signoret, has been found on imported orchids.

Chinaspis biclavis, Comstock, is found over all the islands on bark of various trees and always badly parasitical. It is not serious in consequence. It may have come from any of the South Sea Islands or Asia. Chienaspis eugeniae, Maskell, is a widely distributed species, it occurs in Australia, Ceylon, China, and Japan and lives upon very many plants. The scale has been doing well with Mr. Jordan, upon imported Japanese Magnolia and Eugenia.

Chionaspis prunicola, Maskell, Diaspis patelliformis, Sasaki, Diaspis amygdali, Tryon, has been found upon imported Japanese plum trees that had died from the effects of the scale which appears to be very injurious in some temperate zones. It is still present upon Japanese pear tree on same place at Honolulu. In Ceylon it was found on bark of Aleurites trilboa, at Hong Kong, on Rhusspa, Amoy, on peach, on the same tree at Formosa and unknown wild shrub, in Japan always on Pyrus, Prunus and Morus, on Juglans, Elaeagnus Ribes rubrum, Salix, Sterculia platanifolia, Fraxinus, Orixa japonica and many other trees and shrubs. While I anticipate no serious trouble from this coccid in the islands, yet it should not be allowed to get a foothold, and should be stamped out in the beginning.

Fronnia camelliae, Comstock, was first noticed upon imported Japanese Potocarpus. It is found most anywhere and has been met with in Australia on many plants, in Ceylon on Mistletoe, on Oleander at Amoy, in Formosa on Psidium and Juniper, Japan on Potocarpus macrophylla, Sciadopytis verticillata, Camillia, Enonymus, etc., on Alligator pears, palms, Camellia, etc., in Honolulu. Aspidiophagus citrinus, Craw, is preying upon the same.

Ceroplastus rubens, Maskell was found but sparingly in the beginning of '94, yet at the present it may be seen anywhere and upon most any tree in Honolulu, although numerous, it is not very injurious compared to other scales. The insect no doubt was introduced with plants from China as it is quite common around Hongkong and there lives chiefly upon the various pine trees. In Ceylon it was found upon Jambosa vulgaris. Two species of Chalcid parasites live upon the same in Honolulu, viz: Tomocera californica, How, and Coccophagussp. A third species that is preying upon Ceroplastes floridensis, Comstock, in Japan, has been introduced in some eighty specimens of both sexes.

Both Ceroplastes ceriferus, Anderson, and C. floridensis have, at innumerable times, been brought in on plants from Japan and China, yet none of these appear to be established.

Lecanium accuminatum, Signoret, is present on many plants in the Islands, yet chiefly upon limes and lemon. It is always badly parasitcized in Honolulu by two species of Chalcid flies.

Lecanium filicum, Boisduval; L. Hemisphaericum, Targioni, Tozzetti; Lecanium coffea, Nietner, is found upon very many cultivated and wild plants throughout the islands, and is preyed upon by internal parasites; it is found common all over the world, chiefly so in the tropics.

Lecanium hesperidum, Linuaeus, is but rarely found on the higher altitudes; it comes from the temperate zones.

Lecanium longulum Douglas, is one of our commonest species and attacks most any plant on all the islands. It was this species that caused the smuty appearance of the ironwood trees in the park before the introduction of the Rhizobius beetle. It is found in the tropics only out of doors.

Lecanium mori, Signoret, is found also upon many plants in the islands, on various ferns, guava, etc.

Lecanium nigrum, Nietner, the commonest of all scale insects in the islands, nearly always can be found upon the Hibiscus hedges, Croton, guava, fig trees, etc. It was met with everywhere in the tropics, Fiji, New Caledonia, Queensland, Ceylon, Singapore, Hongkong and Formosa. In Japan it can not live out of doors, and is found only in green houses.

Lecanium oleae, Bernard, is not found numerous in tropical countries, it is rarely met with in Honolulu. Only in one instance have I seen it numerous upon oleander, on Hawaii.

Lecanium Tessellatum, Signoret, another species found here and there, but not numerous as yet, it is more often attacked by internal parasites.

Pulvinaria, mameae, Maskell, and an unnamed species in Kona, are perhaps the only well established species aside from P. psidii mentioned above. It had first been found upon Mamea Americana, Linni. during Jan., '94, but since then it was found on many trees in Honolulu, especially mango and fig. No parasite has been observed on the same, yet without doubt the Chryptolaemus larvae and those of the numerous species of Hyperaspis introduced from California and Japan will destroy its eggs. A fourth species of Pulvinaria was found at Honolulu upon newly introduced Potocarpus from Japan, where the insect is rather rare upon many trees, especially the camellia and magnolia.

Planchonia sp., so far but one specimen was found in Honolulu upon Jacaranda mimosifolia, Prosopis dulcis, Oleander, fig trees, etc., and it is preyed upon by an internal Chacid parasite to such an extent that in some instances the scale has disappeared entirely from some trees. Found at Hongkong, China, upon fig tree and badly parasiteized. *Eryococus araucarieae*, Maskell, is found on all th Islands upon the various species of Araucaria; it comes from Australasia.

Of Dactylopius we have a great many species in the Islands but yet they are with a few exceptions, not worked up. It is one of the most easy species to introduce, since many of them when full grown will often leave the plant and secrete themselves most anywhere to deposit their eggs, often on the roots, in any crevice or behind leaves on stem, etc., the most minute examination of plants could not reveal them.

Icerya purshasi, Maskell, is so far the only species present in the Islands. I. Aegyptiaca, Douglas, and I. Sulphurea, Maskell, are found on many plants around Hong Kong and may be brought in at any time. The two lady birds preying on those species in China viz: Kodolia fumida, Muls. and R. pumila, Weise, were introduced and no doubt are breeding upon I. purdrasi which once so numerous, can now only be found after careful search.

The above comprise the principal coccids found in the Islands, very many of them are preyed upon by internal parasites but were brought in with their host. Some of these are doing very beneficial work, often destroying a large percentage of the scales. Only in few instances were scale insects with internal parasites introduced by me, since there is more or less risk in doing so, it was considered the safest way to follow, only to send the numerous predacious insects found preying on the scales and here we have the numerous lady birds, some two hundred species of which had been introduced with more or less success. It seems that those introduced from the tropical countries, or such that are found in similar latitudes to that of the Islands within a few degrees, have succeeded best to establish themselves: especially when the same coccid upon which they fed in their home was at hand, the increase was marvellous.

Aside from the parasites and predacious insects introduced we have established two species of fungoids destructive to all the Lecanidae and these have since spread over most parts of the Islands. A repeated trial with a third Microcera coccophylla, that lives upon the expense of the various Diaspidinae, has as yet not been so successful. Still I am confident ef also establishing this very valuable agent to eradicate the scales. It was met with in New South Wales northward to Cairns, Queensland. It is present in Ceylon, China, Formosa, and even as far north as southern Japan, chiefly upon the various Aspidiotus and Mytilaspis, coccids that are always abundant where they occur, owing to their hard protective covering, the enemies preying upon the same have not the equal chance as those preying upon other scales.

At the present time, the most pernicious coccids, at least, have practically become harmless and will become still more so with the increase of their various enemies. I anticipate no danger to the vastly increasing coffee culture by scale insects still present, some of these will yet cause a little trouble to the citrus trees, but I am confident to overcome the same in the near future, as has been done in the past, not with artificial means, but with natural enemies, which if once established, are an everlasting benefit to the country where introduced.

Of the introduced Coccinellidae I will give a short account of some of them. To my knowledge, and that of Rev. Blackburn who studied the insects on the islands some twenty years since, only three species of lady birds were present. Those were Coccinella abdominals, Say, and American insect and no doubt, introduced at a very early date, since it has been known to the oldest residents. It feeds upon Lecanidas and Aphids, is not a fast breeder and since the introduction of other forms has become much less in number. The other two are small Scymnus, S. ocellatus, Sharp, and S. vividus, Sharp, the last at least, has repeatedly been found breeding upon plant lice. Owing to the large quantitles of Coccinella repanta on the Islands, none of the California forms that live upon plant lice have been observed as yet, save that one visitor on the dinner table in the club on Nov. 10th, viz: Coccinella Californica, Man., introduced three years since, yet we are safe to say, several species will turn up in time, if properly searched for. Chilochorus bivulnerus, Muls., was brought to the Islands, in 1891, on my trip to Australia and turned over to Mr. A Jaeger, who liberated the samo.

Again large quantities were sent to you during Dec., '94, with all other California forms. The insect was found breeding, both in '94 and during the last summer, yet never numerous. This is one of the most numerous native lady birds in California that feed upon various scale insects, and a higher altitude may be suitable for their increase. Sendings of these as all other forms will be made again to the various parts on the other Islands direct. Hyperaspis were sent to you in several species, all of these feeding upon the various mealy bugs, (Dactylopius), then and still so numerous in Honolulu. You have forwarded one of the beetles to me at Sydney, some ten months later, as breeding in Honolulu. This has been H. undulate, Say., and I personally have not met with it since, owing no doubt to the enormous increase of other forms, and in consequence the scarcity of its food.

Large numbers of Scymnus were also forwarded to you, and strange to say one of the very rarest California species, S. debitis. Lec., that had not been found again ever since being described over forty years ago, was met with in quantities while collecting Rhizobius upon Casuarina. The little beetle in California breeds upon Dactylopius, and very likely on the same in the Islands, D. Calceolaria, Maskell, on the sugar cane would be similar to that on grass in California.

Of the Australian forms we certainly have the most beneficial of all the lady birds introduced. Of the Aphis feeding species, Coccinella repanta, Thumb., has done wonders in destroying all the; various forms of lice on trees, shrubs and plants. It appears usually first up on the orange plant louse it has practically cleaned out the taro louse, and with it has cured the formerly so prevalent disease upon these plants which decayed to a large extent in consequence of the myriads of plant lice present; and recently it has shown its ability upon the newly appeared louse in the cane fields at Kauai, Oahu and Maui. It has spread within one year, after being distributed by you, over all parts of the Islands, and was met with both on Hawaii and Maui as high up as timber will grow. How unfortunate, that upon such beneficial friends we should find a parasite destroying the same to a large extent, yet such is the fact. Everywhere the beetles may be found, apparently at rest on the leaves, yet under it and between its legs a small yellowish silken cocoon is found, from which in due time hatches a small black hymenopterous parasite, Centistes, Americana, Riley, an insect found all over the world preying on aphid feeding lady birds. How long the parasite has been present on the Islands is hard to say. Undoubtedly it had been breeding upon Coccinella Abdominalis many

years. It had been found upon the same by Messrs. Miller and Wait at Kona before the introduction of other Coccinellids by me. Leis conformis, Boisd. had been observed breeding upon the orange Aphis early in 1894. Another very valuable lady bird that feeds upon the various Aphids, and one that had always been found in small numbers only in Australia is Platyomus lividigaster, Mulsant. It was met with in that country from New South Wales up to Cairns, Queensland, and chiefly upon the orange Aphis. It was also noticed that a large percentage of their larvae were destroyed by a parasite, and owing to this fact the comparative scarcity may be accounted for. On the other hand, there is no such parasite as yet known in the Islands, the beetle was never yet found destroyed by the Centistes fly and in consequence may even prove of more value in time than the Coccinella rapanta. Its dusky larva is unlike those of the Coccinella proper; it is covered all over with long spines for protection. The rather small black beetle is nearly round and has the sides of thorax bright sulphur yellow. It is a most active creature.

Of Orcus., O. Chalybcus, Boisd. has increased most upon the various Diaspidinae chiefly, yet it will feed up on most any scale as well as Aphids. The Chryptolaemus montrouzieri, Mulsant, is in my opinion the most valuable lady bird introduced into the Islands. It is always found upon any plant infested with Mealy bugs. It relentlessly follows up that destructive Pulvinaria and devours its eggs. It likewise devours Eriooccus araucariae, Maskell, infesting the various Araucaria. You distributed the same during 1894, and on my recent inspection it was met with everywhere on all the Islands upon its fast disspearing food; around the Volcano, upon the various forest tree, and shrubs it was very numerous; from there down Pahala over the lava flows it was numerous upon the scanty bushes growing. In Kona it was met with up to an altitude of 6,000 feet, and here was simply swarming upon Myoporum sandwicene, Gray, infested with Lacanium fillicum, Boisduval, its larva feeding upon the Dactylopius present. On Maui it was found upwards to the timber line and is very likely even higher. That far famed Vedalia cardinalis, Mulsant, did good work in Honolulu upon the one scale, Icerya purchssii, Maskell. The Chrytolaemus beetle did equally well upon about a dozen species of coccids. Many other enemies were introduced for the Icerya scale, and one of them at least, Novius Koebelei, is at present abundant.

Of Rhizobius a large number of species were introduced, and *R. ventralis*, Erichson, that feeds upon the various Lecanidae, has become the most abundant. It will feed upon Pulvinaria as well and can at any time be found upon Araucaria trees, preying upon Eriococcus; owing to its valuable work the numerous species of black scales are disappearing. At the Kapiolani Park the Casuarina, formerly a complete black mass, owing to the numerous Lecanium, longulum, Douglas, have entirely recovered from the blighty appearance, and both the beetles and larvae could be found in any numbers during summer. Of the smaller Australian beetles, Cyreme nigellum, Blackburn, has perhaps increased most, and it was met with everywhere in Honolulu.

With the Ceylon Coccinellids nothing could be done, the distance is too great and all arrived at Honolulu dead. One of these, and certainly the most valuable found there, Chilochorus circumdatus, Gyllh., was later sent over from China. This insect had been recorded from Ceylon, India, and Sumatra, and consequently its occurence around Hong Kong could be expected. During three months, Oct. to Dec., '95, a careful search had been made in the neighbourhood of Hong Kong, and of the insects introduced many are breeding in the Island.

Synonche grandis, Thumbeig, is the largest known lady bird that feeds upon Oregma bambusae, Buckton, infesting the various Bambus plants in the Malay Archipelago, Ceylon, China and the southern Japan. A fresh specimen of these was found upon orange Aphids in Honolulu on May 6, 1896, and may have bred here. Verania discolor, Fabr., found near Hong Kong and Swatow was again met with in Honolulu eleven months later; it feeds upon Aphids. Coelophora pupillata, Swartz, found common near Hong Kong upon Celtis siuensis, infested with Psylla, was met with all summer upou Aphis at Honolulu.

Coelophora biplagiata, Swartz, collected and sent from Hong Kong, has been noticed in Honolulu for several months after my return. Chilomenes quartriplabiata, Swartz, had been observed breeding upon plant lice, and Dactylopius and will prove a valuable addition. Cryptogonus orbiculatus Gyllh, is a very common little lady bird. It was found numerous upon orange, etc., at Atami, Japan, it was breediug by the thousands upon Mimosa pudica, L., infested with Dactylopius adonidum, Linn.—the common Mealy bug—at Cooloong, China, and in Formosa again, it was numerous upon the tea plants that were infested with Chionaspis theae. This will be another valuable help in destroying the various Mealy bugs. The beetle was found very numerous during Nov. at Honolulu.

Platynaspis nigra, Weise, has been sent both from Japan and China, in the former country it was always one of the commonest lady birds upon orange infested with Diaspidinae. At Yokohama it was bred in numbers from a small powdery white larva on trunk of Styrax japonica S. and Z. It was always in numbers upon camellia hedges infested with various scales; found common in China upon orange and feeding upon Aspidiotus Diaspis and Mytilaspis; also at Formosa numerous upon Chionaspis theae. In Honolulu likewise, the little beetle lives upon the hardest scale insects such as Aspidiotus aurantii. Maskell A. longispina, Morgan, and Mytilaspis citricola, Packard.

Sticholotis punctatus, Crotch, was found in Japan and China, in Honolulu during the summer always upon Eriococcus araucariae, Comstock, upon Aleurodes sp., infesting Jasmin, and upon many other plants. While searching for Coccinellidae to be forwarded to the other Islands, in the beginning of November, the little beetles were swarming, so to speak, in the Government Nursery upon most the tree trunks, on fences, etc., searching for a hiding place to winter in. The species of lady birds enumerated above are no means all that have established themselves on Oahu. Only in some four gardens in the city where they collected, and a thorough search for them no doubt will reveal many other forms; some may even breed in the forest on the mountain where he have not looked for them.

Of the other introduced predaceous and parasite insects, it appears that some Syrphid and Chrysopa flies are established. Chalcis obscurata, Walker, is making war in earnest upon the Pyralid larva destructive to the coconut leaves, banana, sugar cane, etc. Finding such an abundauce of Lepidopterous larvaeit also preys upon those of Tortricidaea congenial climate, and no parasite present to prey on its own larva, it is no wonder that within one year this parasite has increased to such an exent that on one occasion, at the beginning of November in Mr. Jaeger's garden, they were seen flying around the trunk of Pritchardia filifera, which has still all the old leaves remaining on the stems, in a perfect swarm. It is in such places that they hybernate for a short time. The insect was found in numbers upon orange trees in the early spring at Japan. In China during November and December they could be found by the dozens sitting amongst the leaves of Pandanus. This Chalcid fly was met with all over the Island of Oahu during the summer, flying actively around the shrubs and trees in search of their prey. It was sent to Kauai and Hawaii. A second introduced parasite was found to prey upon the Pyralid larva on coconut leaves, a species of Proctotrupid, not yet identified, it was sent from Japan with many other forms; this also was introduced on Kauai.

In addition to the numerous predaceous and parasitic insects, it was also found advisable to introduce Rats, Toads and Frogs. So far the results of the introduced California Bats, of which over six hundred reached the Islands living, has not been very encouraging, since little is seen of them in Honolulu.

Several trials with Japanese bats resulted in a failure. On the other hand toads from California and Japan are breeding and the four species of Japanese frogs no doubt as well. The benefit to the Islands through the introduction of these Batrachians will be considerable. Since all of them live chiefly on insect life, they will have sufficient food for a long time to come, on the numerous Japanese beetles (Adoretus umbrosus, var. tenuimaculatus, Waterh), on the cane borer (Sphenophorus obscurus), and the numerous cut worm larvae.

A great many of injurious insects are yet present on the Islands, and they will be dealt with entirely by introducing natural enemies for the same. Artificial remedies even if effective for a short time are too expensive, and if possible I will not recommend such. We cannot use effectively washes or hydrocyanide acid gas, as is done in America, without injury to the tropical plants. I have taken the work upon me to do the best for the Islands without further expense, and I will not recommend nor even approve of them. (We yet will have to deal with the various cut worms and other noctuid larvae that are a serious drawback to the growing of garden produce.) Agrotis ypilon, Rott, a cosmopolitan insect, is probably one of the commonest and most injurious, it is found on the sea shores and up to the highest mountain peaks. A saucia, Hbn, another moth found everywhere, was also observed to attack garden vegetables on the higher elevations and also a number of other species of Agrotis equally injurious.

The American army worm, lecania unipuncta, Haw, is very numerous. It feeds upon grasses, and consequently equally well upon the sugar cane. At Olaa a Noctuid larva was seen swarming upon and destroying the various weeds amongst the coffee plants, not feeding upon these however. The larva of Plusia verticyllata, is doing more or less damage to the young coffee plants. The most numerous of all however is the Pelua, Laphygma frugiperda, Hbm, occasionally found covering grasss land for miles. Then there are large numbers of Tortricids, Pyralids and Tineids present. All the introduced species are injurious in more or less extent according upon what they feed.

Upon all the many introduced species of Moths there are exceedingly few introduced parasites to be found, the indigenous forms living upon native moths are hardly ever met below an elevation of 1,500 feet. The most valuable parasites of Noctuid larvae are the Tachina flies, of which but one native species exists on higher elevations.

Of Migrogaster, none have been observed upon Noctuid nor Sphingid larva on the Islands. Many injurious moths have found their way to the Islands, yet save a very few hymenopterrous parasites, we may say they practically enjoy an almost entire immunity from such.

A small white fly, a species of Aleurodes, is causing some anxiety in Olaa district. They have increased enormously upon the coffee trees. Many insects preying upon the same were recently sent there, and others will follow in succesion, as well as internal parasites, and I am confident with these they will speedily disappear. At the same place Slugs are also destructive, and a trial will be made to introduce such beetles as are known to live upon the same.

THE JAPANESE BEETLE.—This beetle, Adoretus umbrosus, Var.; Tenuimaculatus, Waterh., has been probably introduced from that country, and more than likely in the soil coming with the numerous plants from there. I met with the insects quite frequently during summer around Yokohama especially while collecting in the forests, where they fell in my umbrella while beating for the various cocinellidae on oak, alder and many other forest trees upon which they feed at night. Not in one instance did I see a specimen in a garden. It is the various species of Cetonia that come to and eat the flowers in gardens, and principally the roses. Repeated search was also made for the larva of these beetles in gardens, yet it is always that of other and larger species that are met with in such places, and the injury caused by them by eating the roots of the various garden plants is very annoying. It was observed at one place that the most of the violets were practically eaten by these larvæ under ground. Mr. Alfred Unger of Yokohama, related to me an instance of the value of the mole as an enemy for the Scarabaeid larva which is worthy to record. A gentleman at that place, in building a lawn for a cricket ground, had a brick wall surrounding this to a depth of several feet to prevent the moles from injuring the lawn. All went well for a few months, at the end of which the grass began to get yellow and die off. All efforts with manure and water were useless, and he continuously found larvæ of Scarabaeids that had come to the surface to die. Nothing could be found to remedy the evil until Mr. Unger advised the gentleman to tear away the wall and give the moles access to the larvæ, which was done, and to the pleasure of the party, his lawn soon recovered.

The beetle at the present time is found all over Oahu, on Maui and Kauai and it will be but a question of time when they will appear on Hawaii, if they are not already present. In going over to Kauai, the insect was found flying around the lamp on the steamer, and also off Maui, on the way to Hilo, one of the insects was found in similar condition. The most trouble will be experienced by the same in the drier localities, whilst in places like Olaa, the fungoid disease destructive to the same will flourish upon and destroy most of them.

ANNUAL BROODS.—In Japan, where the temperature will probably allow the larvæ but six months active life, it may be that there it has but a single annual brood, and with the many enemies present it is no wonder that the beetle in consequence can be called rare. I have had the larvæ barely out of eggs in Honolulu, and yet in three weeks later they were full grown upon the decayed manure—not in general use in Japan—where they doubtless fed upon decayed vegetable matter, as they also do on the Islands. The elongate small white eggs hatch in about seven to ten days, and the pupae gives forth the mature insect in from ten to fourteen days. Thus it will be seen that the whole transformation takes from six to seven weeks in summer at Honolulu.

FOOD PLANTS.—These are too many to be enumerated. After the roses were gone the beetles paid their attention to various other bushes and trees in Honolulu and but few remained entirely free from their attacks. The orange was more or less attacked, and so had been the Arabian coffee tree, yet the Liberian coffee tree in some instances was practically defoliated, as were peach trees. The taro and cane leaves are also relished; and like the guava, alligator pear, pomegranate, Java plum; the grape vines are defoliated, and so is the umbrella tree (Terminalia catalpa), various palms, especially Areca and Phoenyx, Cycas; many of the garden plants, as the Mexican vine, sunflower, and even violets, suffer from their enormous appetite. Many more plants could be mentioned, but it would be far easier to give a list of such not attacked by them. The same could be said of their work in the forests; here also some of the trees had the appearance as if fire had gone through them.

ENEMIES.—As the beetle is a night-flying insect, only becoming active after the few insect-feeding birds have gone to rest, and as there are no moles present, not even a single Carabid beetle to feed upon the larvae, these can breed in hundreds. The minah bird no doubt devours all the beetles that he can get, yet we never have observed it to search for the same as does the house sparrow. Almost every crevice was examined around houses, walls, etc., and the rough bark of trees likewise. Here the sparrows could be seen climbing up and down the bark nearly as well as a woodpecker, searching for these beetles for its offspring.

Sarcophaga flies were repeatedly bred from jars containing these beetles, and on an old fern stump. hollow within, where the beetles secreted themselves, the newly hatched flies were almost daily observed sitting on the outside. It is a well known fact that these

flies are not parasitic, strictly speaking, and the young maggots, are likely left upon the dead beetles only.

During April last, upon an old root with ferns growing on same, hanging suspended, on the hotel veranda, I found successively three dead beetles, covered by a greenish gray fungoid. The respective root had been brought down from the mountains previous. From out of them the spores were taken and brought in contact with twenty healthy individuals in a glass jar kept slightly damp with Sphagnum moss. They were daily given fresh food, as during all the subsequent experiments. To my astonishment and delight, thirty hours later, one of the beetles was seen dead, with its legs outstretched, and on the various joints the white fungoid growth made its appearance. In two days more the grayish green fruit was present. For weeks these experiments were kept up, always with good results. The fungoid was most successfully raised upon sterilized black bread; less so on white bread, potato with glycerine, sweet potatoes, gelatine with Agar-Agar, banana and fruit juices. Later on the beetles were placed in large tight wooden boxes, the bottom of which was covered with about one inch of slightly damp soil; a few handfuls of dead beetles showing spores were placed on top of this; fresh and slightly damp food was given, and the healthy individuals placed within. Thus we infected quarts of diseased beetles that were distributed all over the Island, and many parties again raised their own seed for distribution. Numerous eggs, placed in infected soil chiefly, hatched; yet all the minute larvae became affected at once after issuing. A few remained unhatched and the larvae were found dead within, yet to all appearances not affected. Larvae dusted with the spores, as a rule begin to die in about five days, become blown and hard, sometimes with a reddish tinge; soon the fungus growth shows on the outside until the larvae appears all white. In a couple of days later the fruit appears, and again the larva slightly shrinks and is covered by the millions of greenish gray fruits or spores. On May 9th a lot of larvae were dug up in a garden, dusted with the spores and replaced. On examining the ground again, May 16th, some were found dead and hard; upon those the spores were ripe two days later. Pupae dusted with spores never hatches, and always produces the fungoid disease.

The virulence of the same upon the beetles was shown already, on August 4th, at Spreckles' garden, under one of the badly eaten Terminalia catalpa trees, the dead beetles could be counted by the hundreds; even on the partly devoured leaves specimens could be seen with stiff, outstretched legs. Likewise at the Government nursery, large numbers of them were lying on the ground.

Both the larva and mature insects of the cane borer are affected by the disease. Later in the season, in a garden where experiments had been carried on, not only did I hardly find any more living larvae of Adoretus, but those of the Aphodius as well were destroyed.

Tineid larvae were found destroyed by the same, and also nice specimens of Nictuids covered with spores were preserved. The large Cerambycid larvae (Aegosoma reflexum) so destructive to sugar cane at Spreckelsville was likewise destroyed by this fungoid. Roaches are as well subject to its virulent effects.

There is little doubt in my mind that in damp localities at least the beetles will have little chance to become very numerous, but how effective the disease will be in dry localities and Honolulu, the next summer will show. The spores have been sent to Washington and Brisbane, Queensland, for experiments at those localities.

A small green Tineid larva appears upon the leaves of sweet potatoes, within which it mines, causing the leaves to turn brown and dry up, and in consequence the plants die off; this is the "Ponallo" of the natives, often destroying the entire plants in whole districts, and bringing great suffering among the poorer classes. The larva likewise lives upon the various other Convulvulus.

The insect was seen at work in Olaa, where in about a week's time the whole field of sweet potatoes had turned brown, not a single parasite or predaceous insect was noticed among the myriads of minute larve that pupate anywhere on the outside of the leaves to a naked Chrysalid.

This and the somewhat allied Plutella cruciferarum living upon the various Cruciferous plants need immediate attention, and hopes are entertained that with the introduction of proper parasistes they will become less to such an extent as hardly to be noticed.

PROWLING ROUND.

(By a Peripatetic Contributor.)

I was anxious to see

THE NEW CACAO PEST,

of which I had heard so much, but little was visible. The trees looked robust and vigorous, but there were signs higher up that the enemy was at work, though less than I should have expected. There was a sprinkling of crop through the trees, and an appearance of blossom about; but I am told that it is later in the year when most of the damage through the pest is made manifest.

We passed a

FINE NEW FACTORY,

a little way out of Wattagama, erected by Mr. Charles Gibbon, but saw no good tea about until we got higher up. There was evidence all round of

NATIVE INDUSTRY,

in cleared-up patches for tea, some poor enough to warrant disappointment ere long, while other bits looked well enough.

"RAXAWA,"

where the tea was vigorous, and the huge stacks of firewood around the factory, were eloquent of much tea to be made. There was the other side too, of a district denuded of its sylvan beauty along the road to Hatale—which road by the way was in anything but good order—the wide and varied view was charming, but the red patches of new clearings did not improve the outlook. We passed strings of carts loaded up with tea, of well-known marks and there were lots of coolies on the road. Turning up to Kelebokka, there was visible below like a white ribbon through green—the road to John's Hill and Knuckles. At the former place in the days gone by - Padré Burnet used to stay, when he was the itinerary clergyman of the planting districts.—These were the days after the "Knuckles Bricks," when the men had a ready pen and were keen on an argument. What theological discussions and doctrinal tussles there were in the Padré's bungalow, for he was a real "argle-bargle Scot" himself, and no gauge of battle was ever thrown down there, that remained neglected. Ah! these men of the past! are we never to see their like again? Is sport to be the one eternal threadbare theme that intellect is to be wasted on?

BRITISH NORTH BORNEO.

The British North Borneo Government has approved of their officials taking up land for coffee planting, and five of the officials are so satisfied of its being a success that they are taking advantage of the privilege. The enclosed para. may interest your readers. Some very important concessions have lately been made in British North Borneo for the working of petroleum, oil, timber and gold, among which we may mention one to the Bombay and Burmah Trading Co. for the working of petroleum oil in the Northern part of British North Borneo where petroleum oil exists. This Company have already acquired a

very valuable oil concession in Sumatra, which they are now developing, and the success attending their operations in Sumatra has led to their acquiring a like concession in British North Borneo.

THE TOMATO.

The tomato is rich in possibilities in the hands of a skillful cook. It can enter into and give tone to endless soups; it can be made into purees and sauces and stews; it can be eaten *au gratin*, with macroni or vermicelli, and *en salade*. There is no reason why it should not be seen more often on our breakfast tables. Carefully grilled and placed on slices of grilled fat bacon, it makes a delicious dish. Then again, we can stew it, place it at the bottom of a dish, and gently deposit thereon poached eggs; or we may vary this by placing scrambled eggs round a pyramid of stewed tomatoes. *Farcie* they can be introduced at breakfast, lunch or dinner; and, as a writer justly points out, "*farcie* tomatoes may not easily be surpassed. Upon your whim or choice it will depend whether you stuff them or cut them in half for so ineffable a purpose. And upon your whim likewise depends the special forcemeat used. Chopped mushrooms, parsley and shallot, seasoned with discretion, leave little to ask for. Prepare, instead, sausage meat, garlic, parsley, tarragon and chives, and the tomatoes so stuffed you may without pedantry call *a la Grimod de la Reymere*. But whatever you call them, count upon happiness in the eating."—*Epicure.*

NORTH BORNEO AND MR. HENRY WALKER.

We refer to another page for such particulars of the attractions now offering in North Borneo to planters and capitalists as may well make the men envious, who have paid sweetly for their lands in this colony and in other less liberal countries. We have been surprised to learn how accessible North Borneo and Sandakan its capital are being made by Holt's steamers—a regular and numerous coasting line—apart from Holt's ocean-going fleet. The proximity to Labuan which is a busy calling-port for the Far East generally, is also a great advantage. We have no doubt that Mr. Walker will have a good many interviewers from among our younger planters, while in Kandy, and that a strengthening of "New Ceylon" with a fresh reinforcement of men of the right stamp may be the result, is decidedly, what we should wish to see. Mr. Walker himself is a man in a thousand, and any pioneer can feel safe with him; while few men have now had so much experience of North Borneo added to a long spell in Ceylon.

INDIAN PAENTS.

Applications in respect of the undermentioned inventions have been filed, under the provisions of the Inventions and Designs Act of 1888, during the week ending 1st May 1897:—

Improved Paddy-husking and Rice-cleaning Machine.—No. 166 of 1897.—Johwar Chandra Majumdar, son of the late Haranatha Majumdar, talukdar of village Aghaid, in the district of Dacca, for an improved paddy-husking and rice-cleaning machine.

No. 187 of 1897.—Amended application—See No. 144 of 1897.

Improvements in Machines for Separating and Cleaning the Fibres of Plants of every Description.—No. 381 of 1896.—Samuel Benjamin Allison, gentleman, of New Orleans, Louisiana, one of the United States of America, at present of Guatemala, Central America, for improvements in machines for separating and clearing the fibres of plants of every description. (Specification filed 22nd April, 1897.)

Improvements in the Methods, Machinery and Appliances used for Withering or Dessicating Tea Leaf.—No. 267 of 1890.—Charles Arthur Burton, manager, Lukwah Tea Co., Upper Assam, for improvements in the methods, machinery and appliances used for withering or dessicating tea leaf. (From 12th May 1897 to 12th May 1898.)—*Indian and Eastern Engineer*, May 15.

THE TRAVANCORE TEA ESTATES COMPANY.

(*From the Prospectus.*)

The capital of the Company is £15,000, divided into 75,000 six per cent. cumulative preference shares of £1 each, and 75,000 ordinary shares of £1 each; but the present issue will consist of only 35,000 preference shares and 35,000 ordinary shares, of which 10,000 preference shares and 14,000 ordinary shares will be issued fully paid to the vendors as part payment of the purchase price. The Directors of the Company are Messrs. H. K. Rutherford, D. Reid, G. A. Talbot, H. Tod, and W. Mackenzie, while the agents are the Ceylon Tea Plantations Company, and the Secretary, Sir William Johnston, Bart. The Company is formed primarily for the purpose of acquiring, working and developing tea and other estates in Southern India, and it is intended with the present issue of capital to purchase and work the following estates as from 1st July, 1896:—Bon Ami estate, Mount estate, Munjamally estate, and Kolie Kanum estate, all situate in the Peermaad District of Travancore, Southern India, at elevations ranging from 2,500 to 3,900 feet. The approximate acreage of each estate is as follows:—

	Tea in Bearing.	Tea not in Bearing.	Tea to be planted 1897.	Jungle and Grass.	Total.
Bon Ami	509	98	—	202	809
Mount	135	—	—	15	202
Munjamally	—	—	400	160	560
Kolie Kanum	—	202	300	298	800
Totals	644	300	700	675	2371

The estates have been inspected, reported on, and valued by Mr. H. V. Masefield, the Manager of the Ceylon Tea Plantations Company, Limited, who recommends their purchase.

The prices per acre at which the planted and unplanted lands of Bon Ami, Mount Munjamally and Kolie Kanum are to be transferred to the Company have been agreed, and it is expected when the various acreages are ascertained that the sale price will amount to £43,000 more or less, payable as to £20,000 in fully paid shares of the Company, and the balance in cash. Taking the reserve lands at a value of £3 per acre, the price being paid by the Company to the Vendors for the planted area of the last mentioned properties is equivalent to about £39 per acre.

THE GREAT WESTERN TEA COMPANY OF CEYLON, LTD.

MANURING: ARTIFICIAL AND BULK.

Mr. RYAN said that if he was not taking up the time of the Directors he would ask a question or two about manuring. He found that it was stated in the Report that practically 2½ per cent had been spent in manuring. He would like to know what the total acreage manured was.

Mr. BOIS:—187.

Mr. RYAN said that he kept a dairy and cattle, and he was of opinion that cattle manure on paper did not pay. It was very difficult to make it pay on paper.

Mr. BOIS said it was well if they had not a cattle

establishment, not to get one, but it they had one, keep it by all means.

Mr. RYAN said he supposed that bulk manure paid, but it would not compare favourably on paper with artificial manure. Artificial manure showed better results on paper. He was sorry to say his cattle manures failed to give the lasting power which was supposed to be given by cattle bulk. He had not found cattle manure would keep the yield for 4 years. He found artificial keep for 5 years. That was his individual experience. He noticed that 187 acres had been manured. It was practically only about 20 per cent. Was it not advisable to increase that acreage. They might manure 25 per cent. There could be no better investment, especially with land as old as that.

Mr. MACKIE said they had to go about in a quiet way.

Mr. RYAN thought that instead of decreasing they should increase manuring.

Mr. BOIS said they might increase their yield very materially, and they might increase their prospects but the benefit they derived was nil. In extreme cases of manuring an increase of about 25 per cent would be given.

Mr. RYAN said that at the same time that other people were manuring they must also manure. He would advise to give 25 per cent manuring. He certainly thought in the interests of the Company manuring should not in any way be diminished, and if possible manuring should be increased.

THE CEYLON AND INDIAN PLANTERS ASSOCIATION, LIMITED.

This Company with the initial capital of £120,000, divided into cumulative six per cent preference shares of £10 each and 8,000 ordinary shares of £10 each, has been registered in London; and the Company has purchased the estates in Ceylon called Laxapana, Maha Elliya and Kandaloya. The two former estates have been purchased for £65,000 sterling and the latter for £16,000. Laxapana in Maskeliya contains 864 acres of which 690 are in cultivation, 680 with tea and 10 with cardamoms. Maha Elliya in Dimbula contains 305 acres of which 265 are planted—all in tea; while Kandaloya in Yakdessa consists of 1,006 acres of which 535 are cultivated—530 with tea and 5 with cardamoms.

The Ceylon Agents are to be Messrs. Skrine & Co. with Mr. George Greig of Laxapana as Manager.

CEYLON TEA PLANTATIOS CO,, LTD. AND COCONUT PROPERTY.

At the annual general meeting of this Company the other day, after Mr. Talbot's speech, the CHAIRMAN, replying to Mr. ADAMES, said :—

With regard to the first year's profit on the coconut estates, property just taken over from natives was always in rather a bad state, and therefore the initial expenditure was much greater than it would be in the future. The profit earned was about £3 10s per acre, which the directors considered fairly good, but they hoped at the present price of the product to work it up to about £5 per acre. It would be several years before the 1,476 acres came into bearing, but every year there would be a few acres coming in. They were now erecting a mill at Mawatte, by which they expected to add to their profits.

THE ACME TEA CHEST COMPANY, (LIMITED),

with a capital of £150,000, has its prospectus advertised in the London papers. The Directorate is a strong one :—

James T. Tulls, Esq., J.P., St. Ann's Leather Works, Glasgow, Chairman ; John Bennie, Esq., Hydraulic Engineer, Glasgow ; James Couper, Jun., Esq., J.P., City Glasgow Works, Glasgow ; Robert Hart, Esq., Tea Planter, Sylhet, India, and 45, Leadenhall Street, London ; Thomas Henderson, Esq., of Walter Duncan & Co., East India Merchants, Glasgow ; Arthur Mechan, Esq., Neptune Iron Works, Cranstonhill, Glasgow ; William Walker, Esq., of James Finlay & Co., East India Merchants, Glasgow.

We read that,—

The Acme Tea Chest Company, Limited, has been formed to acquire, as at 17th March, 1897, the business of manufacturing and selling Steel Tea Chests hitherto cartied on by the Acme Package Company, Limited, together with the works, plant, machinery, patent rights, contracts, and whole other assets of that Company. The business of the Vendor Company since its formation in 1894 has developed to a remarkable extent and is still rapidly increasing. The Company recently acquired in feu extensive and very suitable works, with convenient railway connections at Polmadie, Glasgow, which previously formed the Glasgow Steel Works. These works having been reconstructed and equipped with special and valuable machinery are thoroughly adapted to their purposes, and are equal to an output of from 20,000 to 24,000 chests per week.

To make their own sheets is the great object of the new Company, and we read :—

The Chests are made of lead-coated sheet steel under hydraulic presure, and they consist of (1) a sheet which forms the four sides, with panels and corrugations which ensure both strength and rigidity ; (2) an ingenious "slip-joint" for fastening and clamping ; (3) a top and a bottom ; and (4) a top band and a bottom band—in all six pieces, to which there are added only six screw-nails, three for securing each of the top and bottom bands respectively. When it is stated that a pressure of 220 tons is required to produce the panels and corrugations on each sheet for an Acme Chest, it will be understood that only the best and softest steel will stand such a test, but, having stood it, the strains and even the accidents to which it may be subjected when filled with tea are as nothing.

(1) The Chests dispense with the employment of costly lead-leaf.

(2) They can be stored in small space ready for immediate use, and are rapidly put together by Coolie labour without special appliances.

(3) They ensure even tares (a most important technical point); and thus minimise warehouse charges.

(4) They may be opened or closed in two minutes (but are easily sealed against pilferage) and so facilitate Customs' examination while avoiding the expense of cooperage.

(5) They prevent loss of tea in transit and preserve its fragrance for a much greater length of time than wooden chests.

(6) Steel being so much thinner, they hold more than wood chests *of the same outside size* and therefore effect a large saving in freight ; being lighter, they also save in inland carriage.

(7) They are preferred by retailers on account of their neat and attractive appearance, and because the empties have a high return value, or may be used again for tea and other merchandise,

Then as to profits :—

The Vendor Company's financial year closes and the season ends on 30th June (the Company's first season having, however, for bookkeeping purposes been closed on 31st May). For season ending 31st May, 1895 (being the first in the existence of the Vendor Company), on sales, amounting to £14,139 2s. 9d., a profit of £1,102 5s. 1d. was obtained. For season ending 30th June, 1896, on sales amounting

to £26,592 14s 10d., a profit of £3,425 16s. 10d. was reached. For season ending 30th June, 1897, *orders have already been obtained to the amount* of £42,000, from which, according to previous experience, a profit of £8,200 should be made. For season ending 30th June, 1898, it is confidently expected that the total sales will considerably exceed this figure; but assuming that no increase upon sales is attained, and that the saving before referred to arising from the Company manufacturing its own sheets, viz., £4,000, is effected with sufficient expedition to make itself apparent next year, the total profit would, at the same rate as in the previous year, amount to £12,200, sufficient to pay 10 per cent. on the ordinary shares after making provision for the dividend of 6 per cent. on the preference shares. This is believed to be a moderate estimate based on past and present working, but if the business continues to prosper as it has done, and is doing, these figures may be largely exceeded.

Finally,—

The purchase price has been fixed at the sum of £112,500, payable as to £25,000 in Ordinary fully-paid shares, as to £25,000 in 6 per cent. Cumulative Preference fully-paid shares (being the largest portion allowed by the Rules of the Stock Exchange), and the balance of £62,500 in cash.

Mr. P. Stuart-Brown, F.C.S., continues to be Manager.

POONAGALLA VALLEY (CEYLON) CO., LTD.

The first annual ordinary meeting of this company was held at the office of the company, 16, Philpot Lane, E.C. on April 28th, Sir George A. Pilkington, chairman of the directors, presiding.

Mr. J. F. Anderson (of Messrs. Lyall, Anderson & Co., the agents and secretaries) having read the notice convening the meeting.

The Chairman said:—Gentlemen, it is my pleasure to move that the report and accounts as presented to the shareholders be received and adopted. The report and balance-sheet as you have it here is so full and complete that to my mind there is very little that is necessary for the chairman to say upon it. I cannot help complimenting the secretaries upon the extremely able and explicit manner in which these accounts are presented. There seems to me little or no need to enlarge upon them, although at the same time I shall be extremely pleased to answer any question which any shareholders may put to me. You will see a considerable falling off in the estimate in the matter of coffee, and I am afraid in the future we must look for a still further falling off in that department of our produce. For years and years past the Island has suffered enormously from the falling away of coffee, and we in the Poonagalla Valley have held on longer than any other part of the Island. Eight years ago I was told that we must not look for a continuation of coffee for more than a year or two at the outside, but every year we have had our rotation crops, and up to last year they have been a very considerable source of income. But it is a decaying source, getting worse and worse, and I am afraid we have now arrived at the time when we can can look for no income from that department. We have tried to take time by the forelock and have planted tea under all existing coffee, so that by the time it is entirely done we shall have tea taking its place. The great difficulty in Haputale is the want of roads. We have been fighting with the Government to get better roads throughout the neighbourhood, and in a short time we shall be in a very much better position than we are in now. The Government have consented to construct a road and bridge which will lead right up to the very door of the Poonagalla factory, and by a system of wire shoots, which will extend all over the estate in time, the whole of the produce will be carried down to the factory by their means, and then by good cart roads and cart service right down to Poonagalla station. This will be a great boon, as the great difficulty all over the Island now is that of Coolie labour. The Coolie can now choose where he likes to go; he can get a good capitation grant, and have his debts paid by any estate. The work which he detests above all other labour is that of carrying produce on his head. If we can get our produced carried down by wire shoots to the factory, and from there by cart, we shall have less difficulty with our Coolie labour than in the past. On the whole, we can congratulate ourselves on the first year's working. We have fairly earned 10 per cent. dividend, and we are paying 6 per cent., and take the unusual proceeding of paying the whole of our preliminary expenses in the first year, and we carry £362 to next year's account. These figures show, I think, a very satisfactory result on the first year's working. Mr. Rettie, the manager of the Spring Valley Estate, and the original valuer of our estate, and whose brother is manager of the celebrated Ouvah Coffee Company, the largest estate in the Island, reports to us from time to time as to the general condition of the estate. He has been here this morning. His reports are very favourable and very hopeful for the future. I don't think that I need say more but I shall be happy to answer any questions which may be put to me. I move that the report and accounts as presented to the shareholders be received and adopted.

Mr. G. G. Anderson seconded the motion, which was carried unanimously.

The Chairman then moved and Mr. Anderson seconded that a final dividend of 3 per cent. free of income tax, making in all 6 per cent. for the year, be declared, payable forthwith.—Carried unanimously.

Mr. Anderson proposed and Mr. L. F. Davies seconded that Sir George Pilkington be re-elected a director.—Carried.

The auditor Messrs. Cape & Dalgleish, were re-appointed, on the motion of Mr. C. J. Scott, seconded by Mr. A. Leslie.

The Chairman proposed a vote of thanks to the staff in Ceylon and London for their efficient working of the company's property and business. He said that as an almost annual visitor to the Island he could say that they had an extremely efficient manager—one of the most experienced, shrewdest, and hard-working men in that capacity he had ever met with. His conduct in the affairs of the company was very satisfactory. He had also a very good European assistant under him. The London staff also had shown an amount of interest in the work of the company that was beyond all praise.

Mr. J. Vicary seconded the motion, which was carried.

Mr. Donald Anderson proposed, and Mr. C. J. Scott seconded, and it was carried, that a vote of thanks be given to the Chairman for his able conduct in the chair, and to the directors for their careful guidance of the company's business.

The Chairman, in responding, invited any of the shareholders, when on a holiday, to visit the estates. He observed that formerly the British tourist went to the Riviera, now they go to Cairo, and soon they will go to Colombo. If any of the shareholders would take that journey, he was sure that the pleasure that they would derive from it would amply recompense them.—The proceedings then terminated.—*Investors' Guardian*, May 1.

THE TRAVANCORE TEA ESTATES COMPANY.

The following are additional particulars from the Prospectus of this Company:—In addition to the estates mentioned, 630 acres of forest land have been purchased direct from the Government of His Highness the Maharajah on the Company's behalf, by the vendors, and will be transferred at cost price. Cabel advice has been received of the purchase of Woolbeding estate, situate in close proximity to the above

scheduled properties, with an approximate acreage of 148 acres tea planted 1888-1896, 95 acres coffee, 174 acres jungle and grass. Total 418 acres, for the sum of £8,000, payable half in cash and half in shares. Negotiations are in progress for the acquisition of other lands, and about 700 acres are being cleared for planting up with tea during the current year. There are factories on Bon Ami and Woolbeding estates, the former of which it is proposed to considerably improve, and another factory will at once be begun on the Mount estate. The tea-making machinery is sufficient for present requirements, but will be added to as the newly-planted lands come into bearing.—Local "Times."

TEA AND TEA COMPANIES.

(*From a London Correspondent.*.)

London, May 7.

CEYLON TEA COMMITTEE.

A meeting of this Committee was held on Monday to consider several questions of importance, including the appointment of a chemist, for which there were applications, in view of the recent Committee in the *Observer* in respect to the alleged falling off in the quality of the tea grown. Nothing definite was however decided upon.

The question of garden bulked tea, and the correspondence that has taken place in reference thereto was also under consideration, the Committee having been asked by the London Wholesale Tea Dealers to invite discussion, but the Committee decided that they could do nothing more and must leave the matter in the hands of the tea planters themselves to deal with and to guard against the objections raised.

The following is the resolution come to by the Indian Association of which Mr. Ernest Tye is Secretay:—"The Committee have assured the trade that importers will do all in their power to meet the reasonable requirements of buyers in this matter but must leave the question of printing words in the catalogues to those concerned." The resolution virtually represents the attitude of both the Ceylon and the Indian Associations.

The Anglo Ceylon and General Estates Company Limited, have changed their address from South Sea Chambers, Bishopgate St. to 20 East Chap.

TEA TRUST COMPANY.

It is understood in well informed circles in London at an early date a very influential Trust Company will be formed for the purpose of dealing in tea shares and other securities in connection with Ceylon and Indian properties. It is probable that the prospectus will be issued very shortly and that the capital will be £250,000. The names of Messrs. Taylor and Ogle are associated with the Secretaryship, and this gives a sufficient guarantee of the stability and genuineness of the concern.

CEYLON TEA IN AMERICA.

The circulars issued by Messrs. Gow, Wilson and Stanton show the very great and encouraging increase of shipments to America. Those for the quarter of the year just ended are practically double of those that took place in the same quarter of 1896.

LONDON TEA SALES.

It was decided to divide the large auction sales catalogued for Tuesday and to sell half the quantity then and half on Thursday. The market still showed an upward tendency, though the quality of the tea was not so good, taking it all round. There were 21,330 packages offered on tea.

The Share Market is a little more active. People are beginning to take a more hopeful view of things both in South Africa and in the East. And there is an increased demand for shares. Fair amount of business has been done in Eastern Produce, the recent annual report of which was regarded as very satisfactory. The report of the Scottish Ceylon Tea Company has also created a favourable impression.

The shares of the Travancore Tea Company, issued at the instance of the Ceylon tea plantation shareholders were over applied for. It is regarded as likely to turn out a very good thing. Mr. W. Mackenzie who was one of the vendors was very much pleased with the result.

NEW ISSUES.

The Acme Tea Chest Company, Limited with a capital of £150,000 in 75,000 six per cent. cumulative preference shares and 75,000 ordinary shares of £1 each, has been formed to acquire the business of manufacturing and selling steel tea chests, hitherto carried on by the Acme Package Company, Limited, together with the works, plant, machinery, patent rights, contracts, and other assets of that company, which recently acquired works at Polmadie, Glasgow, and equipped them with special machinery equal to an output of 20,000 to 24,000 chests per week. The formation of a new company, with larger capital, has been resolved upon, the prospectus states, mainly with the object of putting the company in a position to manufacture its own steel sheets. The purchase price has been fixed at the sum of £112,500, payable as to £25,000 in ordinary fully-paid shares, as to £25,000 in six per cent. cumulative preference fully-paid shares, and the balance of £62,500 in cash. There are now offered for subscription 50,000 preference and 50,000 ordinary shares.

PLANTING NOTES.

A BRAZILIAN PROVERB says:—"Coffee to be good must be as black as night, bitter as death, and hot as sheol."—*American Grocer.*

NEW CORN PRODUCT.—The discovery that the pith of the corn stalk can be used in the construction of war vessels is likely to be of benefit to agriculture in more than one way. The chief use of this pith is for a packing between the inner and outer shells of the vessel, so that when pierced by a projectile it will absorb water and swell so rapidly as to close the opening before the vessel leaks to a dangerous extent. Experiments with this pith have been so satisfactory that it has been adopted in the construction of all our new vessels of war, and European nations have commissions for investigating the same material, so that the use of corn pith will make a market for what was once a waste product. In the process of extracting this pith the blades and husks are removed, and the stalks are cut into small pieces. When the pith is taken out from this stalk, the remainder is ground up into a flour-like substance which resembles bran. Some experiments with this "new corn product," as it is called, have been made at the Maryland Station with the remarkable result that it is found to contain eleven per cent. more of digestible matter and two per cent. more of digestible protein than the whole fodder does when shredded. It contains as much digestible matter as the corn blades, and more total digestible matter and half-of-one per cent. more protein than Timothy hay. It does not contain as much digestible albuminoids as Wheat-bran, but it equals that food in the total amount of digestible matter. It keeps as well as bran or Cotton-seed meal. It is in such condition that it can be uniformly mixed with any ground grain, and when used as a base it is possible to make a complete and normal ration for stock in one bulk without the necessity of feeding grain and hay separately. Animals fed upon such a ration eat it with relish, and keep in normal condition. Since there is only one pound of pith to fourteen pounds of blades, husk, and stalk, this new material amounts to a very considerable portion of the fodder.—*Garden and Forest.*

ROYAL BOTANIC GARDENS:

ADMINISTRATION REPORT OF MR. DIRECTOR WILLIS FOR 1896.

ENCOURAGEMENT FOR PARA RUBBER CULTIVATION.

THE first Administration Report of a new Director of the Royal Botanic Gardens is always regarded with special interest. It usually affords an indication of the tastes of the writer, and of the direction in which he expects to make himself most useful to the Government and the Colony. Mr. Willis follows three notable men—two of whom, at least, achieved a European reputation for their scientific attainments. The list includes the late Dr, Gardner, Dr. Thwaites, and Dr. Trimen. We need not dwell on what the Colony owes to each of these Directors; but we may say that, perhaps, Dr. Trimen best combined his love and pursuit of science with the desire to do his best for the country by "Notes on Economic Plants," by experimental Gardens at different elevations, and by readily attending to private enquiries, for the benefit of the planting and general agricultural industries of the Colony. It was in his time that the Badulla, Heneratgoda and Anuradhapura Gardens were established. We need scarcely refer to the notable scientific work done by Drs. Thwaites and Trimen. The former gave botanists a very full and learned compilation on Ceylon plants; while the latter in a far more popular, and yet truly scientific form, very nearly completed his Ceylon "Flora."

Now, it is a fortunate thing for the Colony and, from what we think we discover of his tastes, for Mr. Willis, that the way has thus been cleared, so far as purely scientific work is concerned. No doubt, Kew and Botanists elsewhere will be making their demands from time to time; no doubt there are new forms of plant life still to be discovered and described even in Ceylon. Certainly there must be many "life-histories" of importance, scientifically, to be worked out. But the great matter is that there is no special and purely scientific work laid on Mr. Willis as a duty, and that he is therefore free to give himself to the department of Economic Botany to which his choice naturally inclines. This is truly good news for our planters and agriculturists generally, and we congratulate them on the full evidence afforded, again and again, in this opening Report, of the good work which Mr. Willis,—if health and strength are spared—is prepared to attempt, and, if possible, carry out for them.

For ourselves, we may say at once, that we have seldom read a Report that has given us more satisfaction. On Monday we gave our readers a taste of Mr. Willis's "Economic Notes." His moderate but wise words on our Tea industry will have been duly noted by the Government, and by the planting and mercantile community; and all he tells us of Rubber is much to the point and will afford the best possible guide to intending cultivators. Dr. Morris has lately been telling Jamaica planters he could not seriously advise them to commence cultivating "rubbers" in view of the enormous development behind Lagos and in other parts of Africa of sources of supply from original forests. And there is no doubt much in this, especially in regard to the West Indies, where they have (at least in Jamaica) the prospect of cultivating a variety of products for the immediate supply of the finest market in the world namely the United States. But in Ceylon Mr. Willis's sober statement of fact is by no means discouraging to the actual, or intending, rubber planter. Indeed, 50 trees of Para rubber per acre, well cared-for, should yield after ten years a regular annual harvest of 100 lb., worth £12 or £13 (or even £10) in London,—rubber culture would be preferable to, and far more profitable than, that of coconuts. The expense of attending to 70 to 80 palms, harvesting, etc., must be as great as that of dealing with 50 Para trees, including tapping, etc.; while the gross return, even at a liberal estimate for the nuts, is well-nigh 100 per cent more in the case of rubber. There is, therefore, clear encouragement to go into "rubber" with the Para kind, provided suitable land be carefully selected and the work of planting properly attended to.

Turning now to the Report generally, it will be noted how practical is the view taken by Mr. Willis of his several Gardens. He regards them all with interest and as serving a special purpose with reference to the agricultural and general public, although the Heneratgoda Garden may, perhaps, be considered his favourite. He is quite prepared to extend their usefulness, and Mr. Willis's references to the necessity of experimental plots, to the work of the Agricultural Chemist, and especially to the distinctive character of "tropical agriculture," show that he is fully alive to the way in which practical aid can most truly be extended to the planters and other Agriculturists of the Colony. But clearly Mr. Willis will want help, and that of Experts, to co-operate with him in several departments. He plainly indicates where the Analytical Chemist comes in, as also the Entomologist—for insect pests ought to be thoroughly investigated—and no less the Fungologist. Give Mr. Willis the hearty co-operation of a "Scientific Agricultural Board"—such as we have been advocating—and we feel sure he and they will soon show the great practical value of their labours to a Colony like Ceylon, so pre-eminently dependent on "tropical agriculture." In every branch of our planting—in hill or lowcountry—and rice, fruit, fibre and vegetable culture by natives, we see room for investigation and experiments such as could not fail to yield noteable results. Such a Board would help Mr. Willis and his able Assistants, Messrs. Nock and Macmillan, to turn the Gardens to far more practical use. It would also help Government and the Colony to a really successful, because liberally and scientifically supported, Agricultural School—not a half-starved crippled institution such as now exists. Planters could fearlessly go for such a "Board" for advice and instruction, to have pests examined, diseases worked out and remedies fully tried. Capital, time and labour would be saved in many directions through seasonable warnings given—as in the case of unsuitable situations for cacao gardens, &c.—or through the demonstration that it would be wiser to abandon one and try another new product, than to go on in the old groove leading to disappointment and loss.

But we must close with a word of thanks to Mr. Director Willis for his full, interesting and suggestive, first Annual Report—may many more follow from the same pen—and also some acknowledgment to Mr. Nock of the Hakgala Gardens for much useful information—some of which we quoted—in reference to the work he so conscientiously and admirably carries out at our Hill Gardens *par excellence*.

(*Extracts from Report of the Director for 1896.*)

1.—CHANGES AND MOVEMENTS IN THE STAFF.

During the early part of the year Mr. Nock, Superintendent of Hakgala Garden, acted as Director. The late Director, Dr. Trimen, returned from leave in England on March 8, still in very poor health, and retired on pension on June 30. A special allowance was voted to him for the remaining six months of 1896 to bring up his pension to the equivalent of full pay, and enable him to remain in the Colony to work at the last volume of his Flora of Ceylon. He persisted in this work in despite of great physical infirmity, but unhappily did not live to see its completion. He died at Peradeniya, somewhat suddenly, on October 16, 1896, and was buried in Kandy.

From July 1 to September 14 Mr. Nock again acted as Director. On the latter date I arrived from England, and at once took over charge of the Department. Some months were naturally spent in familiarizing myself with all the details of the condition and working of the Gardens, and no changes of importance were initiated until towards the end of the year. I subjoin, according to precedent, a brief account of the general condition of the Gardens, indicating those directions in which I have begun or contemplated any change.

2.—GENERAL CONDITION OF THE GARDENS.

PERADENIYA.—The area not occupied by offices, stores, bungalows, &c., is about 120 acres, employing about 100 coolies. Of these men many are employed in road-making (there are about 4½ miles of carriage roads and 2¼ miles of footpaths), sweeping, grass-cutting, &c. Of the great beauty of the garden little need be said here, except that any change which would injure it is much to be deprecated on every ground, artistic or utilitarian. The number of visitors from other countries is large and increasing, and would probably be even larger were there any accommodation at Peradeniya.

The general condition of the garden is excellent, considering the drawbacks which have to be contented with; the chief of these are poor soil and want of manure and water. It would be hard to choose a worse site in this neighbourhood for horticultural work, the southern end of the garden is very rocky with shallow soil, and the northern part is composed almost entirely of old river deposits of gravel and sand. The beautiful sylvan character of this part of the garden is deceptive, giving the impression of a rich soil rather than the reverse. Most of this land (some 60 or more acres) is quite unsuited to the cultivation of anything but hardy shrubs or trees. It is now occupied by the Arboretum, a collection of trees and shrubs from all tropical lands. These are not at present arranged in any very sytematic order, but the greater part of the ground is appropriated in plots of suitable sizes to the various natural families of plants. When a new tree is planted it is placed in its proper systematic position in the Arboretum, and in felling trees care is taken to remove those occupying wrong positions in the grouping. This process has been going on for ten years or more, and ultimately it will result in a properly classified Arboretum, where it will be easy for visitors to find any desired tree instead of having to search as at present over 60 acres of ground. The south end of the garden also contains many young trees, but these were properly arranged at the time of planting. The Arboretum contains about 800 jak and sapu trees, which are used for timber and firewood, new ones being started as old ones are cut down; it is intended gradually to eliminate these trees from the regular Arboretum, and confine them to a timber reserve in one part

The second great natural disadvantage is the want of water. Owing to the position of the garden in a river bend, and to the formation of the land itself, there are no steams within the garden, whilst the river is at too low a level to be available. All the water supply is brought from a distance in pipes (often blocked by heavy rains), and is distributed over the southern part of the garden in small bricked channels. More of these are wanted, as well as an increased water supply. A branch pipe to the bungalows is desirable, water at present having to be carried long distances.

The buildings in the garden are numerous; the bungalows, Museum, &c., are kept up by the Public Works Department, and are at present in fair order; the remainder are maintained from the garden vote, and I found them in urgent need of repairs, which were taken in hand at once. The chief of these buildings are (1) the cattle shed, (2) the octagon house, (3) the conservatory, (4) the glass-roofed plant house, (5) the fern house, (6) the carpenter's shop, (7) the cart shed, (8) the Gardner memorial, (9) the Thwaites memorial.

The gardening staff, apart from coolies, consists of five "selected coolies" (50 cents a day), who do more skilled work than ordinary coolies, 4 "gardeners" (R12·50 to R15 a month), 1 "upper gardener" (17·50), 1 "kangany" (R15), 2 "plant collectors" (R20 and R35), and 1 "head kangany" (R55), besides the European Curator. The plant collectors act as kanganies or gardeners when not on tour. Most of the officers mentioned are rather kanganies than gardeners and there are few who are capable of doing really skilled horticultural work. It was hoped when the class of upper gardeners was created a few years ago that a supply of educated young men would be drawn to the Gardens to learn the work, and that they would afterwards be able to get well-paid posts in other employ as gardeners. This hope has not been realized. Of the three posts of this nature, the two upper (at Hakgala) are still held by their original occupants, whilst the successive holders of the third (Peradeniya) post have left the Department to compete for clerkships in other branches of the Public Service. It is a pity that this should be so, but there is no opening for skilled gardeners in the Colony outside of this Department. If good work in horticulture and experimental cultivation is to be done, it is absolutely necessary to have educated and well-trained gardeners, and this is impossible if the best that such men can obtain is a salary of R20 or R25 a month; the better-paid posts in this Department are so few that a man can rarely get one before he is forty or forty-five years old. At present if any really skilled work has to be done, it falls to the Director or Curator, whose time should rather be devoted to general superintendence and to the initiation of new work. The most important work of the Department is in this way much handicapped.

HAKGALA.—The total area is 550 acres, mostly jungle and patana. The cultivated area is about 25 acres, employing about 50 coolies, besides 2 "upper gardeners" and 1 "clerk and foreman." The garden is upon a steep slope with much rainfall and rather poor soil. A considerable part of it is devoted to the cultivation of ornamental plants, and forms a pleasure resort of extreme beauty, in great favour with residents and visitors at Nuwara Eliya. A good deal of land is occupied by nursery plots for the growth of flowers and vegetables for stocking the garden and for sale to the public, and other portions are used for experimental cultivations of economic plants, &c. The general condition of the garden is excellent in every way in spite of the ravages of deer, &c., from which protection is much needed. The garden has proved of much service in the introduction of economic plants into Ceylon (notably cinchona in the past and many fruit and vegetables in recent years). Its great elevation renders it, however, of use to a comparatively limited area of country.

HENARATGODA.—This little garden of 39 acres, employing about 12 coolies and a native conductor, is one of the most useful in the Department. Its higher night temperature renders it much more favourable to the growth of tropical plants than Peradeniya, and it has a good rainfall and fair soil. Most of it is devoted to the growth of important economic plants suited to the wet low-country districts. An increased labour vote is urgently required, as well as a new visitors' shed and room for carrying on experimental

work. A wire fence to prevent cattle trespass is also a necessity. This garden was originally opened as a nursery for Para rubber, and an immense number of plants of this species are now cultivated in Ceylon and the East, the progeny of the original trees still at Henaratgoda. Many other cultivations have been added to this, and the garden now contains a fine collection of useful and ornamental plants, and deserves to be more visited than it is, considering its easy accessibility from Colombo and elsewhere. The process of rubber-tapping may be seen early every Saturday morning, and there are many objects of interest, including a few acres of original jungle.

Anuradhapura.—This little garden of 15 acres, employing about 6 coolies and a native conductor, is very pretty and well stocked with plants, but often suffers from floods or drought. The extreme apathy to improvement of the surrounding native population renders the garden of less use than need be, but an improvement in this respect may be hoped with the opening up of the country and extension of irrigation works. It is the only garden we possess in the extensive dry country (⅔ of Ceylon), and I am strongly opposed to its abandonment, even though at present its success seems but little. Many plants grow well at Anuradhapura that do badly in the wet region, and we may yet hope to see many important cultivations in this at present thinly inhabited country.

Badulla.—This garden occupies 11 acres, employing a conductor and about 6 coolies. It was opened in 1886, and so is yet very young. It was thickly planted with every kind of plant likely to grow well, and now requires thinning. Many plants thrive well here, and it is hoped that the garden may prove of much use in the Province of Uva. The climate of the eastern side of the mountainous district is so different from that of the western that experience gained in one district is not always applicable to the other, Some details of interest with regard to the growth of trees,&c., are given in the detailed report below.

Speaking generally of the last three gardens, their most urgent wants are increased labour (the staff of coolies at present is barely enough to keep them in tidy condition), wire fences (except at Badulla), cooly lines (except at Henaratgoda), and a new visitors' shed, &c., at Heneratgoda.*

3.—The work of the gardens.

Under this heading fall to be considered some aspects of the work carried on in this Department other than mere routine. The chief are (1) the introduction into Ceylon of economically important plants, and the carrying out of experiments upon their cultivation; (2) other scientific work upon the Ceylon flora, diseases of plants, their physiology, &c.; (3) the sale of plants to the public.

(1) Introduction into Ceylon of new and important Economic Plants: Experiments in Cultivation, &c.—This is one of the chief objects kept in view in the working of the Department, and every effort is made to carry it out in spite of all hindrances. Much has been done in the past and is being done in the present, but it is desirable that the usefulness of the Botanic Gardens in this direction should be increased continually, and it will be well, therefore, to consider the chief obstacles to this increase, which are the want of skilled labour and of suitable areas of good land.

The available labour force is chiefly consumed in keeping the Gardens in good order—weeding, watering, grass-cutting, sweeping, road-making repairing buildings, culverts &c. propagating and planting out, and so on. Properly to carry out extensive cultural experiments would require an increased labour supply, especially of a skilled kind. As explained above, most of our native gardeners are not capable of attending to such skilled work as selection of parents, propagation from choice shoots or seed, hybridization, cross-fertilization, and so on. So long as all work of this kind must be personally done by the Director or Curator, it will be impossible for the gardens to do very much in the advancement of skilled scientific horticulture or planting in the Colony. In this connection I would again draw attention to the needless waste of much of our skilled labour involved in propagating and selling common garden or verandah plants. If this were given up, much more could be done in useful cultivations. To cultivate and experiment upon an economic plant upon a scale sufficient to give really reliable results requires that a large area shall be devoted to it; thus over 4 acres of good land have been given up to Para rubber for nearly twenty years, and it is intended to plant another acre for experiment in 1897. The good land in these Gardens, suitable for such work, is very limited in area, amounting to, perhaps, 48 or 50 acres in all the Gardens together. It is evident, therefore, that the amount of land given to each of the numerous useful plants at present cultivated or on trial must be very small. At Peradeniya in particular there is very little good land available, perhaps 15 acres in all, much of which is occupied by nurseries, vegetables, fruits, &c.

An annual vote of R500 is allowed for the purchase of plants and seeds, chiefly of course from abroad. Much of this at present has to be spent in keeping up the supply of roses, &c., for sale to the public, for such plants so soon deteriorate in Ceylon. If this trade were abandoned, much more might be spent on useful seeds, &c,

It will be of interest to give here a list of the chief cultural experiments at present in progress upon any important scale :—

(1) Indiarubber.—The Gardens contain a large collection of rubber trees of all kinds. About 3½ acres at Henaratgoda are devoted to experimental plots of Para rubber (*Hevea brasiliensis*) of various ages. There are many hundreds of thousands of trees now in cultivation in Ceylon and elsewhere, but none are yet ready for harvesting. In anticipation of the time when this will be the case I have commenced an important series of experiments at Henaratgoda, with a view to solving, if possible, the following among other questions: (*a*) How often should a tree be tapped? (*b*) What are the best times of year and of day to tap? (*c*) What is the best method of tapping? (*d*) What is the best way of curing the rubber for the market? (*e*) What is the effect of manure and other circumstances on the yield of rubber? (*f*) Can rubber be profitably obtained from the leaves, and if so, how best? (*g*) What is the labour-cost per pound yield? and so on. These experiments will probably continue over several years, and results will be published from time to time. They are again referred to below under economic plants.

(2) Coffee.—Several plots of various kinds of coffee are being cultivated at Peradeniya and Henaratgoda with the view of determining the kinds best suited to cultivation in Ceylon, where disease is so prevalent. It is eminently desirable that a larger area be devoted to each, and that careful breeding, selection, judicious hybridization, &c., be carried on to obtain, if possible, hardy varieties suited in Ceylon. This, however, is impossible without more skilled labour.

(3) Cacao.—A number of plots of different kinds are on trial. The remarks made in the last paragraph are equally applicable here.

Other plots are devoted to (4) *Sisal Hemp;* (5) *Gambier;* (6) *Camphor;* (7) *Coca;* (8) *Vanilla;* (9) *Nutmegs;* (10) *Pineapples;* (11) various shade and timber trees.

(12) Garden Vegetables.—A good deal of land is given to native and foreign vegetables. It is very desirable that experiments in the breeding of improved forms of tropical vegetables should be instituted, but the work requires skilled labour, space, and much manure.

(13) Fruits.—Many European fruits are on trial at Hakgala, and tropical fruits in the other Gardens. The remarks made on vegetables apply here also. Cultivation is rendered very difficult by constant theft of the fruit.

* The votes for labour, &c., have been increased for 1897 from R2,200 to R3,000 at Henaratgoda, from R1,200 to R2,000 at Anuradhapura, and from R1,500 to R2,000 at Badulla; and a special vote has been sanctioned for wire fences.

In this connection I would draw attention to the desirability of greater communication and co-operation between the Gardens and those whom they are designed to benefit. More effectual means of bringing before those who are interested in them the advantages offered by this Department, and the results of work done, or particulars of work being done, in the Gardens are very desirable. And, on the other hand, it is also much to be desired that the Gardens should be kept better informed of all that is going on in planting and cultivation of all kinds in different parts of the Colony. I hope, before long, to complete my organization of a scheme for the attainment of both these ends.

(2) Other Scientific Work.—Under this heading I have grouped together all the other branches of scientific work carried on in the Gardens; many of these, though of much importance, have received but scant attention in Ceylon.

The native flora has been very fully studied, and when the remaining volume of the late Director's "Flora of Ceylon" is completed, the Colony will be in possession of a really first-class handbook to its native plants, and their local uses. To provide such a work, as well as a good reference Herbarium and a collection of drawings of the native plants, is one of the first duties of a Botanic Garden. This work is now approaching completion, and the energies of those officers who have been engaged with it may now be gradually diverted to new fields of scientific work. The further elaboration of the details of the Flora can now be left largely to local botanists, aided by occasional collecting tours by the staff of the Department, especially in those distrcts which are as yet insufficiently explored. It may be remarked however, that the construction of a Flora is only the beginning of a proper scientific investigation of the botany of Ceylon, and that there is an unlimited field for further observation and research.

Important work has yet to done in the study of the economic uses of native Ceylon plants as sources of food, fruit, fibre, drugs, &c. It is intended to devote a certain amount of land to such questions but there are very many which require the aid of chemical or other experts.

Cultivation in the tropics is carried on very much in the dark, and very little is really known about it. A consideration of its general state, and an application of the knowledge gained in the temperate zones, point almost irresistibly to the conclusion that if really permanent success in agriculture is to be attained, such subjects as rotation of crops, scientific manuring, and so on, must receive as much attention as in Europe For such work, however, the aid of the chemist is indispensable.

Another direction of work is the study of the diseases of plants in Ceylon, whether they be the result of animal or vegetable (fungoid) parasites, the latter especially. The spread of reliable information among cultivators as to the real nature and meaning of diseases is much to be desired. The experience of the coffee disease has clearly emphasized the general principle that it is but rarely that there is a specific cure for a specific disease, but that we must rather trust to "prevention," or aid nature in throwing off the disease. Much harm is done in this direction through ignorance or selfishness, and it is hoped that this Department may aid in the dissemination of sound knowledge upon this subject.

The advance of scientific agriculture in Europe and America is largely due to research in vegetable physiology and in allied subjects. It is very desirable that such work should be conducted to a larger extent in the tropics, where much of the experience gained in Europe is of no avail, owing to the different climatic conditions. Many botanical experts and students visit the tropics every year for such work, and it is very desirable that every encouragement be offered to them to choose Ceylon as a field of work. The laboratory here is, however, very small, and needs extension.

Another branch of work recently commenced in the Department is photography. A dark room is being fitted up at Peradeniya for the purpose. The usefulness of the art in all scientific and horticultural work needs no explanation.

(3) Sale of Plants to the Public.—The Gardens sell not merely economic, but also ornamental and other plants and seeds at low prices. The sale of economic plants is of course one of the chief duties of the Department, nor can any objection be made to the sale of such ornamental and other plants as cannot be got from local sources, nor to the sale of any plants whatever at the outlying Gardens; but there is no good reason why the time of the most skilled men at Peradeniya and Hakgala should be largely taken up in propagating and selling plants of the commonest kinds at low prices. Such work should be left to local florists and nurserymen. The revenue thus obtained is small, the cost of its collection is large, and it does not even come to the Department at all.

PERADENIYA GARDEN.

Roads and Paths.—The main drive, for a distance of 135 yards from the entrance, and the monument road, were thoroughly repaired in January and February. A road was made leading up to the Curator's bungalow.

Buildings, &c.—The site of the old Head Gardener's bungalow, close to the public road was taken in hand in February and transformed from an unsightly mass of ruins to a tennis court, bordered by a bank of turf. Most of the buildings in the garden, other than those kept up by the Public Works Department, being in a more or less ruinous condition, were taken in hand in the latter quarter of the year. The work of rebuilding and repairing them will continue into 1897. The cart shed, whose roof was only prevented from falling by the support of a large tree at one end, was rebuilt in a stronger form. Soon afterwards the carpenter's shed entirely collapsed during heavy rain the whole structure with most of its contents being destroyed; fortunately the accident occurred on Sunday, when there was no one in the building. This is also being substantially rebuilt. The roof of the cattle shed was also in a dangerous state, and much of this structure has been rebuilt. The fernery roof also proved to be rotten; new timber was cut from trees in the garden and the entire roof was rebuilt. The carrying out of these repairs involved a large outlay, which was met by saving on other votes than "Pots, Tools, &c." The other buildings of the garden also require repairs, *e.g.*, the Museum, Herbarium, Director's and clerk's bungalows, and others. The bank at the back of the Curator's bungalow was cut down to a gentler slope and turfed; an immense improvement was thus effected in the appearance of this part of the garden.

Landslip.—The heavy rains in December caused a flood in the Mahaweli-ganga on the 17th, resulting in a very extensive landslip at the end of the cooly lines. The position of these buildings is now a dangerous one, and requires early attention.

Cultivation &c.—A good deal of labour was spent in levelling and extending the space behind the stores where the plants in bamboo pots are kept. A number of large trees were cut down to give more room and light.

Special attention was given to the nursery in the early part of the year: the paths were levelled and straightened; the beds were forked up, manured, and stocked with as large a variety of useful plants as they could hold.

A considerable addition was made to the kitchen garden, and a very full collection of native and foreign vegetables and medicinal plants put out in it.

The following species flowered here for the first time in 1896, viz., Abroma fastuosa, Ægiphila Martinicensis, Aphelandra nitens, Baphia sp., Barleria lupulina, Bromelia Pinguin, Calpurnea aurea, Ceratotheca triloba, Cyanotis kewensis, Diacrium bicornutum, Eranthemum elegans, Faradaya splendida, Hibiscus micranthus, var., Ixora illustris, I. salmonea, Justicia Armstrongii, Phyllarthron comorense, Randia maculata, Saintpaulia ionantha, Victoria regia. The last-named is worthy of special remark; it was grown

on a mound of earth and compost formed in the warmest part of the pond; it began to flower on November 3, and at the time of writing (April, 1897) is still in bloom.

WEATHER.—An unusually wet year on the whole, especially in the north-east monsoon. The total fall was 28·72 in. above the average of the past ten years. The greatest fall in any twenty-four hours was 6·58 in. from December 15 to 16.

VISITORS.—The total number of visitors for the year is approximately 18,000: the book kept at the lodge was signed by 2,520 persons not resident in Ceylon, the largest number on record, and an increase of 237 over last year. A number of seats have been provided for the convenience of visitors, and have been much appreciated.

GUIDE BOOK, LISTS, &c.—The last edition of the "Hand Guide" will soon be exhausted. I find that the sales of this work are almost entirely to extra-colonial visitors, and I am therefore preparing a smaller and cheaper edition in the hope that it may prove of more use locally. A number of copies of the "List of Plans cultivated at Peradeniya" still remain, but the list is now very incomplete, and material is being collected for a new one. A list of seeds available for exchange or sale is also in preparation, and will, it is hoped, be ready for the press early in 1897. Another desideratum is a new Catalogue of the Library, the old one being very incomplete indeed.

5.—HAKGALA GARDEN.

The following extracts from the full report of the Superintendent show the chief work that has been done during the year:—

NURSERIES.—The usual stock of ornamental and useful plants has been kept up in the nurseries, and large quantities have been distributed to different parts of the Island. I regret to report that many thousands of small plants and seedlings were destroyed both in the nurseries and in the borders by the excessive rainfall during the latter part of the year; the foggy, sunless, wet weather for almost three months together proved too much for many introduced plants. Geraniums especially suffered this season; this was to be expected when for days together the heavy rain silted the soil up the stems as high as six to nine inches.

A wattle fence was put up all round the new nursery Such a fence keeps out hares and larger animals for a time, but in a damp climate like this it soon becomes decayed and useless, and much labour is required to keep it in repair. I trust we shall soon be allowed a permanent and effective fence of wire and wire netting.

The beds of Turkey oak (*Quercus cerris*) mentioned in last year's report have grown well, and are now ready for distribution; they are nice, strong, little plants, and will be useful and interesting for planting round up-country bungalows.

About 100 scions of plums and apples were grafted on to common stocks, and the greater part of them have taken well.

A good supply of Cherimoyer seeds was presented to the garden in October by Mr. John Tily, of Dimbula. Most of these were sown in beds and boxes, and the remainder sent to the Badulla and Peradeniya Gardens.

Over 900 packets of seeds were sown in seed pans and boxes, and several beds of seeds were sown in the nursery. No fewer than 50,136 seedlings were pricked out or transplanted during the year, 88,703 cuttings were planted in the nursery and propagating house, and 6,886 plants potted.

CLASSIFIED HERBACEOUS GARDEN.—By far the heaviest piece of work during the year has been the making of an entirely new Herbaceous garden. This has been made upon the old site; it is irregular in shape, measuring 130 ft. in its greatest length, with an average width of 57. The slope of the old garden was very steep; the gardient of the new one is only 1 in 60. A turf bank, 120 yards long and from 1 to 10 ft. deep. was formed all along the lower side, and the upper part cut down in a corresponding degree. The garden is divided into two parts by a rock bank 4 ft. high, and the two parts are connected by a flight of steps. Other flights of steps, five in all, lead out of the garden in various directions.

The garden is laid out into 45 beds 4 ft. wide with paths 2½ ft. wide between them, and with a wider central path. The beds are edged with small red tiles, specially made for the purpose at Mahagastota brick kiln; these form a neat and inexpensive edging. The total length of the paths is 318 yards and of edgings 682 yards. About 800 species of herbaceous plants have been set out in their proper places according to their natural orders, and most of them are doing well. It will of course be some time before all the beds are filled up. The hard, steep bank at the upper end has been planted with a variety of suitable plants in small pockets.

ROSE GARDEN.—The old rose garden, made in 1884, was found to be on too steep a slope. The plants u it being worn out, it was decided to reduce the slope and make a new garden upon the same site. The new garden forms a circle 64 ft. in diameter, with a gradient of 1 in 60; a large quantity of soil was excavated and used to fill in the hollow below. A central drain, 3 ft. deep and 33 yards long, with six cross drains, each 30 ft. long and 2 ft. 6 in. deep, was made; each has a stone "box" drain, 4 inches square at the bottom. The whole plot was dug to a depth of 2 ft., and the bad soil replaced by better. The bank which runs round three-fourths of the plot was finished to an angle of 45 dg. and turfed; two flights of steps were built upon it. During the early part of December the garden was laid out into beds 6 ft. wide, with paths 4 ft. wide, and verges of English lawn grass. The weather was, however, too wet for planting. A collection of 120 varieties of roses was received at the end of the year from Messrs. Smith & Co., of Worcester, and these, with others, will be planted early in 1897.

FOOT AND-MOUTH DISEASE.—This disease broke out at the end of August; nearly all the cattle suffered from it, and one weak old cow died.

PORCUPINES.—These destructive animals paid us a visit in July and did much damage to plants of the Lily and Iris families, especially *Moræa iridioides*. In November they came again and completely destroyed a large number of handsome clumps of Wedding flower (*Moræa Robinsoniana.*)

VISITORS.—The number of visitors during the year was 1,568, against 1,528 last year. The largest number in any one month was 248 in April, the smallest 33 in July.

WEATHER.—1896, rainfall, 110·04; days, 220: 1895, rainfall, 94·15; days 205; average rainfall, 90·78; average days 207.

HENERATGODA GARDEN.

This is a most valuable and interesting garden, and it is to be regretted that it is not more often visited, considering its nearness to Colombo. The garden is well kept, but much more might be made of it were the labour force slightly increased and a regular supply of manure ensured; without the latter no real cultivation of the many important plants contained in the garden can be carried on. Cattle trespass continues to give much trouble, and will do so until a barbed wire fence is placed around the garden. Labels also are much wanted. The bridge outside the entrance is becoming dangerous and requires repair.

WEATHER.—The following table gives the rainfall for the year; the last quarter was unusually wet:—

Total, 1896, 103·78 in. on 173 days, against 102·71 on 154 days in 1895.

7.—ANURADHAPURA GARDEN.

This pretty little garden is in good order, with the exception of the buildings, which are in a ruinous condition. The chief requisites are increased labour supply, new cooly-lines, repairs or rebuilding of the conductor's bungalow, a wire fence, and a supply of manure. The garden suffers in usefulness from the apathy of the inhabitants, but it may be hoped that with the opening up of the country and the extension of irrigation this will not always be so.

VEGETABLES.—As at the other gardens, I began in the last quarter of the year to make a collection of vegetables of all available kinds, for introduction among the villagers and others. The Government Agent, however, having opened a vegetable garden upon a larger scale than anything that we could attempt, most of the seeds and plants have been handed over to him.

BADULLA GARDEN.

Like the two last-named, this garden suffers chiefly from want of labour and of manure. The cooly lines are in a very bad state and require rebuilding, and the shed is also out of repair. A good stock of plants is now available for distribution, but there are few applicants.

TREES &c.—Most of the trees have made good progress, and as many of them are now nine or ten years old, it may be useful and interesting to give the names and measurements of a few of the fastest-growing trees, which may be useful to those wishing to plant in this locality :—

Of Conifers, *Cupressus torulosa*, *C. macrocarpa*, *C. Lawsoniana*, *Thuja orientalis* and *Frenela rhomboidea* thrive best; some are 25 ft. high and 40 in. in girth. *Grevillea robusta*, 50 ft. high, 48 in, in girth ; *Cedrela Toona*, 50 ft. high, 60 in. in girth ; *Parkia Roxburghii*, 50 ft. high, 72 in. in girth ; *Cassia grandis*, 40 ft. high, 45 in. in girth ; *Spathodea campanulata*, 35 ft. high, 45 in. in girth ; *Cedrela odorata*, 45 ft. high, 66 in. in girth ; *Poinciana regia*, 30 ft. high, 30 in. in girth ; *Cananga odorata*, 50 ft. high, 45 in. in girth ; *Pithecolobium Saman*, 40 ft. high, 108 in. in girth ; *Albizzia moluccana*, 60 ft. high, 108 in. in girth.

Havea brasilensis (Para rubber), seven years old is 40 ft. high and 30 in. round ; *Swietenia grandifolia* (a mahogany), five years old, is 35 ft. high and 24 in. in girth. The Palms are mostly doing very well, and many will soon be yielding seed. The Giant bamboo is growing rapidly. The *Pimenta* also gives promise of doing well in this district.

Chrysobalanus Icaeo (coco-plum of West Indies), the jamboo, the Malay apple, and other fruits, besides the oranges, &c., are doing well.

WEATHER.—A wet year on the whole, especially towards its close.

NOTES ON ECONOMIC AND OTHER PLANTS.

TEA.—The year has been favourable to this crop, the export once more being the largest on record. It exceeded 108 million pounds, an increase of almost 11 million pounds over 1895. The area under tea cultivation continues to increase, though more slowly than in previous years. The average price has been lower (about 8½d per lb.) and exchange higher—two circumstances tending to check extension.

The tea plant seems admirably suited to the poor soil of Ceylon, and is also remarkably free from disease; this is prabably in great part due to the tannin in the leaves. It will not do, however, to assume too great permanence for this immunity. Tea being a leaf-crop stands manuring well, and this is a great ciumstance in its favour ; the use of manure appears to be steadily increasing.

The tea industry would appear to have about reached its zenith, and a more critical period in its history seems likely to commence, demanding the attention of planters to scientific questions as to manuring, coarse or fine plucking, methods of manufacture, rotation of crops, and so on. The increased production, and the fact that the competition is now less with the hand made teas of China than with the factory teas of India, Java, &c., will gradually render haphazard cultivation and manufacture no longer profitable.

COFFEE.—The export of this product in 1896 fell, partly owing to bad crops, to little more than a third of that 1895.

The planting of Liberian coffee is apparently increasing slowly. Several kinds of Coffee are on trial in the Gardens (see section), but none show much promise of usefulness, being much attacked by leaf-disease. *Coffee stenophylla* in particular suffers from the disease. Great expectations have been aroused by the success, in Java, &c., of the hybrid between Liberian and Arabian, and I hope to obtain this kind in 1897 for trail here.

CACAO.—The exports show a steady increase; those of 1896 exceed those of 1895 by about 4,000 cwt. Much anxiety was caused during the last quarter of the year by the rapid spread in Matale and Badulla Districts of a disease which has attacked the trees for some years past, increasing in destructiveness every year. The nature of the disease is at present unknown, but every effort will be made to discover its cause and to check its ravages.

The Nicaraguan cacaos referred to in the report for 1895 are now established, and some are growing well.

From the report for 1896 of Mr. Hart, Superintendent of the Royal Botanic Gardens, Trinidad, I quote the following paragraphs :—

"The 'Old Red Dutch' cacao sent at my request by the late Dr. H. Trimen, Director of the Ceylon Botanical Department, for comparison with our varieties, proves to be synonymous with the true Criollo cacao of Trinidad, having the same form and also the same white or light-coloured seeds. The Criollo variety has however almost diappeared from cultivation, being ousted by the more vigorous growing Forastero imported from the Mainland, with which it has evidently hybridized, if the numerous varieties or intermediate forms between the two kinds now to be seen growing in every plantation are to be taken into account. On estates where the Criollo form predominates the cacao produced is of the finest quality. The origin of the colour and form of Ceylon cacao has therefore been now fully ascertained.

"I would point out, however, the direct influence for good which a change of climate, or rather a change of seed from one climate to another brings to pass. The Forastero has practically ousted the Criollo of Trinidad. The Criollo introduced into Ceylon has done well there, while the Criollo of Nicaragua will as certainly fall before the recently introduced Forastero, as the same kind has been already displaced by it in Trinidad.

"Cultivators of all kinds will always find that great benefit arises from making a change of seed from one country to another or from one district to another."

COCONUTS.—The export of oil continues to fall off, but that of most of the other coconut products shows an increase. The area of land planted in coconuts is also increasing.

RUBBER.—The tree of Para rubber (*Hevea brasiliensis*) which was tapped in 1894 was again tapped this year, yielding 3 lb. ¼ oz. of dry rubber, or rather less than in 1894. The yield of this tree has been 27¾ oz. in 1888, 42 oz. in 1890, 45 oz. in 1892, 51 oz. in 1894, 48¼ oz. in 1896; total in nine years 13lb. 6 oz., or about 1½lb per annum. The tree is now twenty-one years old, and should bear tapping every year. I desire to call special attention to this yield, for many persons entertain the most exaggerated ideas of the rubber-yielding capabilities of this and other trees. Of course a much larger yield can be obtained for one or two years, but it is at the sacrifice of the life of the tree. If the results of the tapping of this tree be taken as a basis, the yield of a rubber plantation after the tenth year (fifty trees to an acre) should be perhaps 100lb. of rubber per acre per year, worth about £12 or £13 in London. In comparing this with other products, it should be remembered that the labour cost of rubber is very small.

The cultivation of Para rubber seems likely to succeed in the low-lying wet districts of Ceylon. There seems little likelihood at present of any serious fall in the supply of rubber from wild sources, but the demand is increasing, and by the time that the private plantations in the East come into full bearing, it is quite probable that the easily accessible native sources will be becoming exhausted.

Little reliable information is at present available on the subject of rubber, and I am devoting what time I can spare from other duties to a series of experiments in cultivation and tapping of rubber at Henaratgoda and Peradeniya (see above, section 3).

These were commenced at Henaratgoda in December chiefly on a plantation of eleven or twelve year-old trees, which being planted only 12 ft. apart, are now much too crowded. About 150 of them will be sacrificed in the course of the experiments, leaving more room for the remainder.

Several plants of Lagos rubber (*Kickxia africana*, Benth.) were received from Kew in 1896, but are not doing well. This species forms a stout tree, and is therefore suited to cultivation, but it will be a long time before seed is available in quantity.

CARLUDOVICA PALMATA.—The attention of those interested in any of the plaiting or palm-leaf industries may be called to this plant, which grows readily at Peradeniya. From the leaves, cut into strips and bleached, are plaited the well-known and expensive Panama hats.

RHEA.—The floating of a powerful company to work the Gomess patents has once more attracted attention to this product, and a good deal of it has been planted in the Colony. It may be well to point out that it is still an open question how far it is likely to succeed here; large areas should not be planted without preliminary trial; only regions of uniform climate and with plentiful supplies of manure are well suited to the plant. It is my intention to open experimental plots of different varieties at some of our Gardens during 1897.

HIBISCUS TILIACEUS (Sinhalese, Beli-patta).—This local plant, abundant in swampy low-country land, especially near the coast, is worthy of attention as a fibre plant. The fibre of the inner bark is an excellent substitute for "Cuba bast," so much used by horticulturists. We are indebted to Mr. Charles Byrde, of Ambalangoda, for a sample bundle of the fibre, which has proved very useful for tying and general garden use. Mr. Byrde states that the fibre is easily prepared.

DIVI-DIVI.—This plant (*Cœsalpinia coriaria*) is now doing well at Anuradhapura, and might be worth the attention of cultivators in the dry regions of the Island. There is a considerable import of the pods into Great Britain for tanning purposes.

COCA (ERYTHROXYLON COCA.—Some inquiry has been made for this plant during the year. At present prices its cultivation should be profitable, but any large production would probably reduce the price of the drug (cocaine) far more rapidly than was the case with quinine, there being much less use for cocaine than quinine.

CAMPHOR.—The batch of seeds received this year failed to germinate, and we shall not have any further plants for distribution for some time. 160 large plants from the old nursery at Hakgala were planted out above the plantation made last year, the plants have made a good start and some of them are now 5 ft. high.

VEGETABLES.—An attempt was made during the last few months of the year to form at each of the Gardens a vegetable garden containing all the native vegetables as well as those exotics which would be likely to succeed, and we have now a fairly good collection. Many tropical vegetables (and fruits) are promising subjects for horticultural work; if they were bred and selected as carefully as has been done with European vegetables, the result in time would probably be the obtaining of a number of first-rate table delicacies. There is a great opening in this direction for nurserymen, planters, and others in the tropics who cultivate upon a large scale. I hope to be able to do a little at times in these Gardens, but we have neither the space nor the skilled labour to do much.

CHOCHO.—We received a few fruits of the white variety in February from the Botanic Gardens at Trinidad. Two plants are now doing well, and bearing a good crop. This variety will grow and crop in the low-country, whereas the green one does not do well below 2,000 ft. It is hoped, therefore, that it may prove a useful addition to our low-country vegetables.

An unfounded rumour is going about among the natives in the hill districts that this fruit is sometimes poisonous, and that its use produces rheumatism. There is no truth, so far as is known, in these statements. Thousands of families in the West Indies feed on this vegetable throughout the season, and no ill effects have been observed.

LUCERNE.—The small plot at Hakgala has continued to crop well. At elevations above 4,000 ft., when once established and well cared for, this useful fodder plant will give good returns for many years.

FRUIT TREES AT HAKGALA.—Mr. Nock reports :—

As last year the crops of peaches, figs, and apples were destroyed by the burst of the south-west monsoon. Fruit trees of all sorts made rapid growth during the months of April and May, and judging from the wood then made any gardener would predict a good crop next year, but I fear it will be the same as the last few years. They do well until the end of the year; then comes the hot sun and dries up the buds and the most likely wood dies.

At the end of May several very good fruits of the Morella cherry ripened, and from June to September English blackberries fruited well. In June a few very fine fruit of a large round plum, known here as the Ooty plum, were gathered. They were of handsome shape and good colour; the largest weighed 1¾ oz., and measured 6 inches in circumference one way. The three next largest weighed 5¾ oz.

ORNAMENTAL PLANTS.—The new African plant, *Saintpaulia ionantha*, which forms a very pretty pot plant, is now well established and flowering freely. Mention may also be made of the success obtained with *Victoria regia* at Peradeniya. There are many pieces of water in the low-country where this magnificent plant should grow well. Its seeds are used in Brazil as a source of flour, and are known as *Mais del aqua*

12.—HERBARIUM, MUSEUM, LIBRARY, AND LABORATORY.

HERBARIUM.—A considerable number of specimens have been mounted and laid in their proper places. The draughtsman made eighteen finished drawings of Ceylon plants and two of foreign orchids, in addition to attending to the Herbarium and Library.

Mr. Nock made a collecting tour to the Horton plains district, and the draughtsman two tours, one to the Anuradhapura District and one to the neighbourhood of Ratnapura.

MUSEUM.—A few additions have been made during the year, but none of special importance.

LIBRARY.—This has been largely increased by the books presented to it by the late Dr. Trimen on his retirement. The available space in the Herbarium is now becoming overcrowded, and it will be necessary during the coming year to incorporate the room under the centre of the Herbarium (next to the dark rooom) for purposes of extension. I propose to cement the floors, &c., and construct a light staircase from the Herbarium, so that books and specimens may be carried under cover from one to the other. This addition will allow room for expansion for a few more years, after which it will be necessary to make an addition to the building. The roof of the Herbarium requires repairs, as also that of the Museum.

FLORA OF CEYLON.—As mentioned at the beginning of this report, this work was left unfinished at Dr. Trimen's death. Three of the four volumes are published, and the plates and a portion of the manuscript of vol. IV. are complete. Application has been made to the authorities of the Royal Gardens, Kew, for assistance in completing the work.

LABORATORY.—This has been occupied during ten months of the year by Mr. W. G. Freeman, of the Royal College of Science, London, who has been working at several problems in the anatomy and development of tropical plants. Several students and others from abroad are expected during 1897, and the available space will be taxed to the utmost. A separate building is required which would be more suitable for scientific work, and would enable the present small room to be used in extending the Museum. At present most botanical students and experts from Europe travel to Java for scientific work, but if suitable accommodation were provided here there is no doubt that many would be attracted to Ceylon.

The results of some of the work done in the laboratory by Mr. Keeble, who was here in 1894-95, have appeared in two papers—one, "On the Loranthaceæ of Ceylon" (our common parasites on trees) in the Transactions of the Linnean Society; and one "On the hanging Foliage of Tropical Trees" (as is well seen in Amherstia) in the "Annals of Botany," 1895.

13.—RECEIPTS FROM SALES.

The receipts of the year were:—Total Sales R3,560·78; Number of Purchasers 761.

The estimated value of plants and seed supplied gratis is:—Total R1,122·01.

14.—EXPENDITURE.

The total cost of the Department for the year 1896 has been:—Total R15,044·16.

John C. Williams,
Peradeniya, April 20, 1897. Director.

PLANTING NOTES.

The Indiarubber-business.—Owing to the increase in the cycle industry the consumption of indiarubber has increased to such an extent —says the *Chemist and Druggist*, that it is estimated that last year alone over one hundred millions of trees were destroyed for the purpose of supplying the requirements of the markets. At present very few attempts at planting indiarubber trees are made anywhere.

The Fauna of British India, including Ceylon and Burma, published under the authority of the Secretary of State for India in Council. Edited by W. T. Blanford.—The mail brings us:—Hymenoptera.—Vol. I. Wasps and Bees. By Lieut.-Colonel C. T. Bingham. It is a handsome book of 576 pages with full index. The London publishers are Messrs. Taylor and Francis, Red Lion Court, Fleet Street. Calcutta: Thacker, Spink, & Co. Bombay: Thacker & Co., Limited. The whole series will be invaluable to naturalists.

Ceylon Tea.—India and Ceylon have taken the position of the finest tea growing districts in the world, and there is little probability that they will ever be ousted from it. Ceylon especially is looked upon with favour by both growers and dealers, whilst the tea to which it gives its name stands unrivalled in the estimation of the consumer. With a constantly increasing demand, and that, too, for the finest qualities, the position and prospect of the tea planters is by no means unfavourable, and the estates which come before the public as the property of joint stock companies offer opportunities for investments which are not to be despised in these days of redundant capital and low rate of interest.—*Financial paper.*

Precious Stones.—We direct attention to a curious letter on this subject in a Madras paper, reproduced on another page. The writer seems to know a good deal about precious stones; but is he aware that the simplest (and yet one of the best) tests applied to gems by M. Nordenskjold—the Norwegian who first got round Asia by Behring's Straits—whose special forte was Mineralogy, was by comparing the brightness of the stone in artificial and in sun light. The brilliancy ought to be as great under gas, candle or match as in the sunlight. M. Nordenskjold examined all the gems in the Colombo Museum, in sunlight and then by striking a match in a dark corner. Ceylon may be said to have a monopoly of cat's-eyes, Alexandrites, and of the finest sapphires. Siam and Burma compete in rubies.

Rubber Supply.—A Zanzibar contemporary, in the last issue received, devotes a large proportion of its space to a consideration of the rubber supply of East Africa. India-rubber is reported to be very scarce just now, and the sources of supply to be diminishing. Such, however, is not the case, for although the West Indian rubber supply is failing, there is an abundance in tropical Africa. From ocean to ocean across Equatorial Africa, we are told, a belt of more or less richly yielding rubber trees is to be found. Negroes who discovered the value of the trees which the white man was tapping, began lopping them down, and thousands of dead trunks are now to be found disfiguring the forests. Whether the yield is increased or not by cultivation of the tree is a disputed point. Cultivated rubber may prove to be cheaper and in the better long run than the wild product by reason of the skill imported into the industry. Only the richest varieties of tree or vine would be grown, the collection and treatment of the juice would be conducted in a less wasteful manner, and there would be no adulteration. —*Indian and Eastern Engineer.*

Shanghai Croton-Seed.—At the last drug-sales there was shown a sample of croton-seeds from Shanghai which failed to find a buyer, presumably on account of the difference in appearance from the usual Ceylon seeds. The sample in question was of a dirty dark brown colour, partly covered with a lighter brown scale-like covering. When cracked the seeds were found to be white, but showed some tendency to shrivelling, indicating a want of freshness. Considering that the *Croton Tiglium*, which furnishes the croton-seeds of commerce, has such a wide distribution from China and the Malay Islands to Malacca, Burma, Bengal, Assam, and Ceylon, it is surprising that regular supplies from most of these countries do not find their way to the London market. The seeds, however, are sometimes imported into India from China, via Singapore. They are regarded by the Chinese as extremely poisonous, and Porter Smith says, "A single decorticated seed was formerly prescribed in dysentery and diarrhœa as a revulsive remedy" by the Chinese. The seeds in question were quite genuine.—*Chemist and Druggist*, April 17.

A Decaying Industry.—The possible disappearance of the art of dyeing in India is pointed out in an able monograph prepared by Mr. N. N. Banerjce under the auspices of the Bengal Government. The number of professional dyers in India is fast diminishing. Aniline dyes and cheap European goods are killing their trade. They are being compelled to turn their attention to new handicrafts, just as French competition and the vagaries of fashion caused the ribbon makers of Coventry to seek a new livelihood in the manufacture of bicycles. Aniline dyes have made every man his own dyer. Formerly, the complicated processes by which indigenous dyes are prepared made the dyer a specialist. Nowadays, anybody can dissolve the chemical powders sent out from Europe, and colour his own clothes. The aniline dyes are more brilliant, and, to the native, they have the superlative merit of cheapness. They are not so fast, and they lack the delicacy of colour, which, judging by the specimens annexed to the monograph, distinguish the Indian dyes. But their very gaudiness makes them more popular, and so the fate of the native dyer is sealed. Silk-dyeing, cotton-dyeing, and carpet-dyeing—all are declining. The fault, it should be added, is to some extent due to the conservatism of the native dyers themselves. They persistently adhere to their crude methods of preparing their dyes, and show a lamentable lack of ingenuity in preparing new designs.—*Pioneer*, May 22.

PLANTING PROSPECTS IN BRITISH NORTH BORNEO:

ESTIMATE FOR LIBERIAN COFFEE.

As we mentioned already Mr. Henry Walker, Commissioner of Lands, British North Borneo, who arrived at Colombo recently by the German mail steamer "Preussen," made a stay of about three weeks in the island, principally for the purpose of affording information to planting capitalists regarding the prospects in that settlement. Soon after his arrival, Mr. Walker left for Kurunegala on a visit to friends, but before he took his departure he kindly favoured us with a few notes which we think will be read with interest by our readers. He mentioned that some very important enterprises are now being energetically pushed in North Borneo by monied Companies or Syndicates, notably the Railway (by the Government) from the Coast to the, as yet, unopened interior. With regard to the tobacco enterprise he said that the crop of 1896 now going to Europe will be 12,000 bales of 188 lb. each and the prices realized this year in Amsterdam, are 50 per cent higher than last year (which were considered high). The timber trade with China is increasing and the Bombay-Burmah Trading Company propose to lay down a large saw mill. As the wood there is suitable for tea boxes a large trade may be done with Ceylon. Petroleum oil is being sought for and the Bombay-Burmah Trading Company lately sent 100 tons of boring plant to North Borneo. Oil is known to exist at two places and it is hoped a large quantity may be found to exist. The exports of coal from Labuan and Bremer Bay are increasing—say 4,000 to 6,000 tons per month. It is used by the P. & O. Company who lately made a contract for 10,000 tons—and it is understood they are satisfied. From a circular prepared by Mr. Walker we are permitted to make the following extracts :—

We have a well divided rainfall, and, consequently, although it is heavy, say from 70 to 120 inches per annum, the effects are not so disastrous as in those tropical countries where the rainfall is limited to a few mouths of the year and the daily fall is so great as to wash away all the humus, and, further, our rocks, including lime-stones, serpentines and conglomerates, are naturally rich in substances suitable to vegetation, aud, when evaded, afford a suitable soil for tea, coffee, sugar, cinchona, gambier, coconuts, &c., all of which (except cinchona) have been tried with success either experimentally or on a large scale, and as our hill lands run up to a height of over 13,000 feet, we can offer the intending planter the prospect of making a home in a cool and invigorating climate.

I believe we now offer better prospects of financial success than any other tropical country. At present we are willing to make free grants of 500 acres on a 999 years' lease to encourage the planting of certain products, provided that the intending investor has £2,000 capital and will make a *bona fide* commencement to bring such land under cultivation within 18 months from the date of the selection of the land and that he will bring one-third of the 500 acres under cultivation within 12 years from the date of the agreement for a lease. Should he fail to cultivate one-third of the 500 acres he will be only entitled to retain 2 acres of jungle for each acre cultivated; but if he desires to retain the balance of the 500 acres he can do so by paying 20 cents rent per acre or purchase such balance at three dollars per acre.

The Currency in use is British North Borneo in the Mexican dollar, which since 1894 has fluctuated in value between 1/11¾ and 2/1¾. The average rate of pay on the estates, including the Mandore (cangany) is between 27 to 29 cents a day. The coolies employed are Javanese, with advances and Malays or varieties of the Malay race, with or without advances as the case may be. On Ulanpakad Estate, now being opened by Mr. E. R. Walker (late of Le Vallon Estate) the coolies employed are obtained on the spot, and the advances outstanding at the end of each month are under two dollars a head, and at Toritipan Estate with a force of over 200 coolies of mixed nationalities, the total advances are usually under $1,000 or less than $5, a head, which amount is not guaranteed by the Mandore, but is a debt, due by each individual cooly. The Javanese and Malays from Singapore usually sign to work a year and receive $12, or even $18 ahead repayable in equal monthly instalments: the locally engaged coolies work on a verbal agreement terminable by a month's notice, and receive two or perhaps three dollars advance, which is really a cash advance to obtain food, and is deducted at the end of the month if the Manager thinks fit.

Food supplies are paid for by the coolies, or each week a chit is granted by the Manager for a small sum which is accepted by authorized shops, where food is supplied at fixed rates, of which a scale in English, Malay and Chinese is hung up on the door of the shop. The transport acquired by the Estate is done by the shopman.

In 1895 I constructed a trial path from the west coast to the interior, where there is a large native population, and since I left (in May, 1896) a Railway (metre guage) has been taken in hand, following much the same line of country. The Railway line when finished will be about 52 miles long with the upper terminus (altitude 600 feet) at the foot of a range of hills running up to 3,400 feet with good soil and well watered. The Railway works now afford employment to a large number of Chinese and natives, and, when completed, a large body of well-disciplined labourers will be available for the planting industry. A planter can now obtain work-people—men, women and children—near the line of Railway. He must, however, be able to speak Malay, a language easily acquired, and he must follow the customs of the country; if he cannot accustom himself to these he had better not come.

I give below an estimate of the cost of opening 100 acres of Liberian Coffee which works out (at the end of the third year) at something less than £15 sterling per acre. The figures were given me by a Coffee Planter in British North Borneo, and are based on rates and wages as now paid. I have appended a few remarks on the items showing where a managing proprietor may economise, and a little examination of the estimate will show that £12 per acre should suffice and that a second 100 acres could be planted for about £10 an acre. I should also mention the fact that the expenditure is becoming less and less each year.

Estimate of cost (in dollars) of opening 100 acres of Liberian Coffee in British North Borneo.

Present rate of Exchang 2s. per dollar

Superintendence, say 12 months at $ 150 per month	1,800
Felling 100 acres at $ 2·50	250
Piling and burning „ 3·50	350
Lining „ 1·00	100
Holing 43,500 holes 2 ft. by 1 ft. 6 in.	435
(10 ft. by 10 ft.) at 1 cent	652
Filling and planting at 1½ cts. per hole..	
Shading at 75 „ per acre ..	75
Supplying	100
Nurseries and seed—N.B.—The seed should be obtained from a high estate in estate in Ceylon or India ..	300
Weeding 6 months at 90 cents per acre per month	540
Roads and Drains	1,000
Lines, 2 sets	150
Bungalow	500
Tools	250
Contingencies	500
Cost at end of 1st year ..	$ 7,002

Superintendence	1,800
Supplying	100
Nurseries	100
Weeding at 90 cents per acre per month	1,080
Roads and Drains	200
Buildings	100
Tools	100
Contingencies	250
Cost during the 2nd year ..	$ 3,730
Ditto 3rd year exclusive of crop expenditure	$ 3,730
Total cost at end of 3rd year ..	$ 14,462

In the foregoing estimate the cost of weeding has been taken at a safe figure. Mr. E. R. Walker opened 36 acres in 1896, and his weeding for the five wet months, October 1896 to February 1897, averaged 80 cents per acre per month and the older coffee on Taritpan Estate costs 55 cents on monthly contract. The item superintendence is a heavy one, but that would bo less *per acre* as soon as a larger acreage is taken in hand. As the actnal cost of living is not more than one dollar a day for food, the intending planter may gauge his own personal expenditure on drinks, clothes, etc. The other items are based on the present cost of works in British North Borneo.

The yield of crop in the 3rd and 4th year should pay for the crop buildings and machinery say a total of £200 to £300. Large stores are not necessary provided a small hot air drying shed be erected, in which the parchment can be dried in about 8 hours and be packed in bags and despatched the same day. The 5th year should give 5 cwts. and when the coffee is 6 years old the yield of coffee may be expected to be 7 cwts. per acre without manure, but with manure 10 cwts. or even more may be expected.

The expenditure on the estate on a crop of 7 cwt per acre should be less than thirteen dollars per cwt. and the London expenses including freight are nearly 9 shillings per cwt., say at present exchange a total cost of about 35 shillings per cwt. As I have previously stated, we find that the estate expenditure is becoming less each year, according as the laobur force becomes more skilled.

HIGHLAND TEA COMPANY OF CEYLON, LIMITED.

The first annual ordinary meeting of this company was held on Wednesday, at the office of the company, 16, Philpot Lane, E. C., Sir George A. Pilkington (chairman of the board) presiding.

Mr. J. F. ANDERSON (of Messrs. Lyall Andersen & Co., agents and secretaries), having read the notice convening the meeting,

The CHAIRMAN said: I have now pleasure in moving that the report as presented to the shareholders be received and adopted. The report as produced by the secretaries is very complete and concisely put together, and the figures are so extremely clear that very little need be said. The proposed dividend of 7 per cent. is in these days, you will admit, a very satisfactory one, and you will see that we are writing off one-half of the preliminary expenses, and carrying forward £404 odd to the next year. Although 7 per cent. is a satisfactory return nowadays, I am bound to say we, as directors, are not by any means satisfied with it. We hope for very much better things. I don't think the estate this year has done itself justice. Of course, against all estates there has been the unfortunate rise in the value of the rupee, which we think, however, will to some extent be done away with again before the end of another twelve months. But apart from this, the estates have not come up to expectation. They are amongst the finest estates in the island; Glenorchy has without exception the finest tea bushes of any I have ever seen in my life. We expect better results both from the average crop and the prices realized. The result of the past year may be explained to some extent by the fact that the manager has been away from the estate on leave of absence home, and we know that nearly every tea district has the peculiarity that the manager who has lived a long time on the estate does better than a successor from another part of the island, who will not understand the particular requirements of the bush as well as the old resident. We reasonably hope for much better things another year. There is little more to be said, but whatever you wish to hear on the subject I shall be very glad to answer you, as I have within a comparatively recent time visited the estates, and I am, therefore, aware of their present condition. The only item of any importance outside the ordinary run of a balance-sheet and report is the fact that you have to fix the remuneration of the directors. That is a matter which we must leave entirely in your hands; you are aware that under the articles of association it is to be fixed at the first annual meeting. I have pleasuse in moving, "That the report as presented to the shareholders be received and adopted."

Mr. G. G. ANDERSON seconded the motion, which was carried unanimously.

The CHAIRMAN then moved, "That a final dividend of 3 per cent. free of income tax, making in all 7 per cent. for the year be declared payable forthwith."

This was seconded by Mr. ANDERSON and carried.

Mr. ANDERSON proposed and Mr. C. J. SCOTT seconded the re-election of Sir George Pilkington as a director —Carried.

Mr. E. J. MARSHALL proposed and Mr. W. D. CAMPBELL seconded that Messrs. Cape & Dalgleish be re-appointed auditors to the company.—Carried.

Mr. DONALD ANDREW proposed, "That the directors shall receive for their services a sum at the rate of £200 per annum until the company earns a profit of 15 per cent., and then at the rate of £300 per annum." He observed that the labourer was worthy of his hire, and he was sure his motion would be received with hearty approval by all the shareholders. The affairs of the company were in capable hands, which in itself was enough to ensure success.

Mr. A. LESLIE seconded the motion, remarking that the remuneration proposed was very reasonable. He admired the chairman's frank statement of the position of affairs, and only hoped that his anticipations would be verified.

The motion was carried.

The CHAIRMAN next proposed that a vote of thanks be accorded to the Ceylon and London staffs for the efficient working of the company's property and business. He said they were well satisfied with their representatives in Ceylon. Mr. Nicol, upon Glenorchy, was an old planter, and Mr. Fraser, on Chrystler's Farm, was also one of the oldest planters in the Island. In both of them they had every reason to show perfect confidence. The staff at home had worked laboriously and honestly in the interests of the company.

Mr. SCOTT seconded the motion, which was carried.

A vote of thanks was passed to the chairman and directors of the company on the motion of Mr. ANDREW, seconded by Mr. LESLIE.

The CHAIRMAN, in acknowledging the compliment, said the directors would do all they could to develop what he believed to be one of the finest and most valuable properties in the Island.—*The Investors' Guardian*, May 1.

SCOTCH CEYLON TEA COMPANY, LIMITED.

Directors :—H. L. Forbes, Chairman, R.W. Forbes, Donald Andrew. Managing Director: H. L. Forbes Manager in Ceylon : David Kerr, Secretaries : Lyall, Anderson & Co.

Report of the Board of Directors, to be presented to the Shareholders at their eigth annual ordinary meeting, to be held at the offices of the Company on Thursday, 13th May, 1897, at 12 noon.

The Directors have pleasure in submitting to the Shareholders the accounts and Balance-sheet for the year ending 31st December, 1896.

		£ s d.
The net profits for the year amount to £8,976 15s. 6d. to which has to be added £852 13s. 9d. brought forward from last Accounts, giving a total sum to be dealt with of ..		9,829 9 3
An interim dividend on the Ordinary Shares of 5 per cent (free of Income Tax) paid in September, 1896, absorbed	2,050 0 0	
Dividends on the 7 per cent Preference Shares have also been paid amounting to	630 0 0	
It is now proposed to pay a final dividend on the Ordinary Shares of 10 per cent (free of Income Tax), making 15 per cent for the year	4,100 0 0	
To add to Reserve Fund (raising it to £7,000) ..	1,000 0 0	
And to write off for depreciation on Buildings and Machinery	797 2 0	8,577 2 0
Leaving a balance to carry forward to next account of		£1,252 7 3

Satisfactory as the above results are, they would have been even more so, but for the higher rate of exchange current during the latter part of the year. The Buildings and Machinery on the Company's Estates are in efficient order, but the Directors think it advisable to continue the policy of writing down their cost, and the amount appropriated for this purpose represents 10 per cent on their value as it stands in the books on 31st December.

The total crop secured from the Company's properties during the year amounted to 720,200 lb. being 48,200 lb. over the estimate and 52,151 lb. more than the previous year's out-turn, which the Directors consider a satisfactory advance. In addition to the foregoing, 170,764 lb. of tea were manufactured for others, giving a total output from the Comptny's Factories for the year of 890,964 lb. made tea. The average yield per bearing acre was 422 lb. against 433 lb. for 1895, the difference being due te the fact that young tea on Lonach estate is now classed as "bearing" although it has not yet attained full maturity. The average price realized for the tea sold in the London market was 8·860d. per lb., shewing a fractional reduction from the figures given in last report. The total acreage of the Company's estates remains unaltered at 1,963 acres, including 1,544 acres in full bearing, 163 acres in partial bearing, and 13 acres planted during the year, or a total of 1,720 acres under tea cultivation.

The Ceylon manager, Mr. Kerr, who resumed charge of the Company's affairs in Ceylon on 1st February, reports that the estates are all in excellent order, and his estimates for the current year point to a continuance of satisfactory returns. During Mr. Kerr's furlough Mr. G. M. Ballardie kindly undertook the temporary management in Ceylon, and the thanks of the Board are due to that gentleman for the able manner in which the Company's interests were looked after by him during his tenure of the post. The Directors have also much pleasure in again expressing their appreciation of the services of the Company's staff, both in Ceylon and London.

In accordance with the Article of Association, Mr. H. L. Forbes retires from the Board, and, being eligible, offers himself for re-election. The Shareholders will also be invited to express their approval of the appointment of Mr. George Gray Anderson to a seat on the Board. As provided in Company's Articles a Resolution to carry this into effect will be submitted at the Meeting. Mr. J. B. Laurie, C.A., offers himself for re-election as Auditor, an appointment which the Shareholders will be asked to confirm.

THE TEA ENTERPRISE IN TRAVANCORE.

CEYLON MEN IN THE DISTRICT.

"Mr. Forbes Laurie's Company own a lot of places," said Mr. Deane, in reply to another question. "Mr. Buxton Laurie, who is well-known in Ceylon, is in charge of the group, and he has another Ceylon man, Mr. Slowcock, and others to assist him. They have 220 acres of new clearings—the best-opened land I saw in the district. It has been exceedingly well done. Amongst others who are known in Ceylon there is Mr. Imray; and he has lately imported two planters from Ceylon to work his places. Mr. Wood, formerly of St. Andrew's in Ceylon, is P. D. on the Mount and Mr. Plaice, who was also on St. Andrew's, is on Munjamally, and Mr. Imray told me they were endeavouring to get two more men from Ceylon, so that the district is gradually filling up. No, I have so far not had a Ceylon man on the Stagbrook group, but I have been looking out for one, and now have practically concluded arrangements with a planter who will suit me, and who will relieve Mr. Holden, who was very kindly lent me temporarily."

TEA AND COFFEE.

"The tea is magnificent, and is doing splendidly, and I saw a very fine field of coffee belonging to Mr Goldie, also an old Ceylon planter. He has a capital field of coffee at a place called Pakanam. It is under grevillea shade, and looks as it would give five or six cwts. an acre. It is coffee Arabica, and it is about 6 years old, for it was just being planted when I was last in Travancore. I think Mr. Goldie got 30 tons off it last year, which was not bad for an estate of 150 acres. One hears a lot of the difficulties of transport, and the consequent enhancement of cost, but even now you can get tea put on board ship for 12 annas a chest. The average cost of tea as far as I could make out was 3¾ annas—that was the average on all the estates in Peermaad, f.o.b., and it is very reasonable. As regards the question of transport, I may say that I was told that the Travancore Government have voted three lakhs for a road from Kotium to Monde-Kaiam, at the foot of the ghaut, a distance of about 50 miles. There is a cart-road there at present, but this money had to be voted for improving it, and the Government advertised for local tenders, but had got none by the time I left. As regards the tea itself, to prove what can be done with a properly-equipped factory, Mr. Buxton Laurie shewed me his accounts for the past year, and in every month but one he had beaten the Ceylon average, and in the one month he failed to do so he was only about a farthing below. I like the tea produced there very much ; it is a good high grown tea and has a vey hilly flavour."

A BOOM IN FACTORIES.

"Where Travancore has hitherto been backward has been in not having proper factories, Until lately there was hadly a decent factory in the district, but Mr. Imray has a magnificent factory now being built ; Mr. Forbes Laurie has a nice factory ; and Mr. Ackworth, Chairman of the Planters' Association, has a very good one, and he got very good prices last year. He has also some of the finest seed-bearers I have ever seen, and anyone wanting seed had better get it through him. He has 60 acres of seed-bearers—once removed indigenous, and I have ordered some from him, He is fully booked for this year, now, but next year he expects to have 400 maunds, and I advise anyone to book with him as the price is reasonable, and the seed excellent. My factory on Stagbrook has hitherto had only hand power, but I have just ordered a lot of machinery from Davidson's for the place. Still, with the hand machinery I made 120,000 lbs. of tea this year! One thing I may tell you in this connection. It is the exception to find a factory without on oil-engine. The Tangey and the Dickson-Ackroyd patterns being most popular, and in no case have I heard a complaint about them, while they work easily and inexpensively. I have ordered one myself.—Mr. H. D. Deane to "Local Times."

SCIENTIFIC AGRICULTURE AGAIN: THE WEST INDIES *VS.* CEYLON.

It is somewhat ludicrous to note the progress made by tiny insignificant West Indian islands in calling in science to the aid of their agriculture and planters, as compared with the do-nothingness of the Ceylon Government. The Ceylon Civil authorities seem to content themselves with showing a budget worthy of the first of Crown Colonies, due mainly to a Customs tariff,—which enlightened administrators ought to be ashamed of,—and to a Railway income with which no single Civil Servant has anything to do. The Ceylon Government got one of the most direct and terrible lessons during 1878-83 ever served out to an administrative body dependent mainly on Agriculture; but how has it been taken and the experience so gained turned to practical use? The only practical step taken in all the years of prosperity which have accompanied the rise of tea, has been the establishment of the Agricultural School—now threatened with abolition! One would think that, after the extinction of our coffee through the operation, first, of an insignificant fungus, and afterwards of a scale insect in green-bug, that one of the first steps taken by a Ceylon Executive would be the establishment of a Scientific Board of Experts to watch over the new staple tea—on which local prosperity so largely depends—as well as over our palm and other branches of agriculture. Not a bit of it. The salary—even temporarily—of an Entomologist was grudged and absolutely refused by Sir Arthur Havelock who, however, took care to avoid fulfilling his distinct promise to cut down the Revenue Civil Establishments after a large part of their work was abolished with the disappearance of the paddy rents. Everything in Ceylon, in fact, has been left for the planter agriculturist to find out for himself, save in so far as the Royal Botanic Gardens, the Director and his lieutenants could render aid. Anything like scientific experiments at the instance of the Government, for the benefit of planters or farmers, Europeans or native, has never entered into the local official mind.

Now let us turn for a contrast to the Far West. Antigua is one of the Leeward Islands with an area of 108 square miles, population under 40,000; total trade under half-a-million sterling and revenue under £55,000—and yet it can have what is denied to Ceylon, a colony nearly as large as Ireland, and the first in revenue, trade, and importance of all Crown Colonies. A recent mail brought us from Antigua:—

"Report of the results obtained on the experimental fields at Skerrett's School, 1896, by Francis Watts, F.I.C., Assoc. Mason Coll., Government Analytical Chemist, and F. R. Shepherd, Superintendent, Skerret's School."

And we have here, in the course of some eight pages of letterpress and as many of tables, most careful and elaborate experiments for the benefit of the local sugar planters after the pattern set by Sir John Lawes and Mr. Gilbert for English Agriculturists. Everything is scientifically arranged, and the results for a whole series of "experimental plots" are given in a way that the simplest planter cannot fail to understand. Now this is only one way in which science could render help to our Agriculture and Planting. But how much money might have been saved, and how much useful knowledge gained, had Ceylon its two officers set apart for such work; while an Entomologist and Fungologist, also of the same Scientific Board, were hard at work in the other directions in which so much can be done for our cacao, tea and coconut planters.

We must sincerely trust that Governor Ridgeway will see his way to give the colony a Scientific-Agricultural Board,—two or three new officers to be associated with the Director of the Botanic Gardens, the Conservator of Forests, and Mr. E. E. Green among others—and if a model is wanted, it can be found in Java, if not in the West Indian Islands; while as to the funds, if there is any scarcity, let them be found by amalgamating—doubling-up—some of the provincial agencies. An Assistant Agency in place of a full-blown Agency at Ratnapura, Badulla, Anuradhapura and even Kurunegala would not be such a revolutionary matter; and certainly the difference, administratively, would not be observed by the people concerned; while, on the other hand, the absolute direct benefit from the Board of Science and Agriculture—or whatever it might be called—could not fail to make itself felt, almost from the very beginning of its work. Has Sir West Ridgeway realised yet that, in coconuts alone, there is room, through improved cultivation among the natives, for nearly doubling the production of one of the most important local food as well as export products of the island; and has it not been made plain that our cacao planters have been working in the dark for many years against a dire enemy; while who can say how long it may be before tea is afflicted? Prevention is better than cure—to learn about existing, if latent, enemies beforehand is far more advisable than to study life histories after destruction has set in.

Here is an indication of what the Government of India is doing in a paragraph just received through the *Pioneer*:—

"Chemistry and Agriculture.—It is understood that the abolition of the appointment of Agricultural Chemist to the Government of India next November, when Dr. Leather's term of office expires, will clear the way for the appointment of a stronger scientific staff for other economic investigations under the Revenue and Agricultural Department experts. The investigation of such troubles as wheat rust and insect blights, in particular, is likely to be undertaken, but details are still very vague. The principle likely to be adopted, however, is broadly to confine the Government paid sciedtific help for the present to such industries as wheat culture, which are in the hands of those too poor to pay for the employment of scientists, industries like tea and indigo being left help themselves, on the ground that they are well able to do so.—*Civil and Military Gazette.*"

Insect blights in Ceylon deserve fully as much attention as in India and they ought to be thoroughy investigated.

The above was in type before we received the very practical and instructive Report for 1896 of the Director of Ceylon Botanic Gardens. Mr. Willis recognises the need for an Analytical Chemist, and we feel sure he would be glad of expert aid in several directions.

Dr. Paul Taubert has died of yellow fever during his exploration of the little-known territory Amazonas, in Manaos. His death occurred on New Year's Day last.—*Gardeners' Chronicle.*

THE CREEPER.

(By a Ceylon Tea Planter.)

The rise and progress of the tea industry in Ceylon has been accompanied by the appearance and rapid multiplication of the "Creeper" in all his varieties. The Creeper is not an insect, nor reptile, nor a plant, nor anything at all interesting from a naturalist's point of view. Although he may be said to live upon tea, tea is not his only food, nor, excepting a few rare instances, his only drink As a rule, he is a good, healthy specimen of British youth. Various causes, more or less connected with a distaste or incapacity for arduous and prolonged study have prevented him from entering the Army or any of the professions, and his parents having no connection with "business," and lacking tho means to maintain him in idleness, are at their wits' end to know what to do with him. In these circumstances, it is very odd if some member or friend of the family does not suggest Ceylon as a happy hunting ground for needy British youth. "Fine climate, beautiful scenery, and all that sort of thing you know. Tea enterprise in a most flourishing state, and sure to afford a great opening. Planter's life very jolly and easy. Out of doors all day, and excellent sport to be had." Inquiries are set on foot, and it soon appears that there is no difficulty whatever about learning to plant tea. There are plenty of planters, but owners and superintendents, who are glad enough to add to their incomes by pocketing premiums, and, in exchange, letting young men do the hard work of their estates for them. They do not put it in that way, of course. They say that, for a consideration of, say, £100 (the amount of premium varies in direct proportion to the calmness and assurance of the individual planter with whom the business is negotiated), they are prepared to teach a young man his work, and that if he is steady and industrious they will no doubt be able to find a billet for him in due course. They allude to certain youths who have learned planting from them, and who have done very well, and they carefully refrain from hinting that such cases are at all exceptional. This seems to be very promising and satisfactory, and as the young man is beginning to be rather troublesome at home, the preliminaries are concluded, his "kit" is purchased, his passage, taken, and he is sent out to Ceylon to make his fortune in tea.

If his friends have arranged for him to begin his career on a good estate in one of the populous dis tricts lying 2,000 feet or more above the sea level he may find the life pleasant enough, and if the superintendent has a natural aptitude for the training of youth, and takes an interest in the Creepers under him, he may learn his work very quickly. Estates and superintendents, however, vary considerably in the facilities they afford either for the enjoyment of life or the acquisition of knowledge. The Creeper must rise very early in the morning, in order to have time for his early tea, for he must muster the coolies, both men and women, at six o'clock, and send them off to the different parts of the estate where their work lies. All day, with the exception of an interval at noon for tub and breakfast, he is engaged in visits of inspection to the various working parties, weighing the leaf brought in by the pluckers, and preparing returns and reports for the information of the superintendent. As most estates are situated on steep hillsides, these daily rounds of inspection entail some pretty severe exercise, and conduce to the preservation of hard condition. Any youth with ordinary intelligence and powers of observation can soon learn the work connected with the Creeper's daily routine, but in order to qualify himself for a superintendent's billet he must master all the processes that are carried on in the factory down by the cart road, where the big water wheel turns unceasingly, and the tea undergoes a course of preparation which changes each fresh green leaf into the shrivelled and tightly-rolled particle with which the consumer is familiar. The work of the factory is superintended by a native or burgher (half-caste) tea-maker, and a Creeper is usually allowed to acquire as much, or as little, knowledge of its details as he may feel inclined to pick up. If he is wise he will learn not only to judge the value of the ultimate result, but also to detect the true cause of any shortcomings, for the tea maker will attribute them to the poor quality of the green leaf, or the system of plucking, or defective machinery—to anything, in fact, rather than want of skill or care on his own part.

It may be imagined that a Creeper who has made himself thoroughly conversant with all the branches of estate work, both on the land and in the fatcory, is thereby qualified to take charge of an estate himself. This, however, is by no means the case. A man may be competent in every other way, and yet be unfit to be a superintendent, owing to his inability to manage coolies. A review of the labour question in Ceylon does not fall within the scope of this article. It is sufficient to remark that your coolie is daily becoming more and more independent, and that he is gradually awaking to the knowledge of the means by which he may take full advantage of the beneficence of the British rule (from his own point of view) in respect of legislation and the administration of justice. To keep the labour force on an estate contented and efficient requires a rare combination of tact and firmness, and a thorough comprehension of the motives by which a coolie is principally actuated, and the methods by which he may be persuaded that he can best secure his own welfare by serving his employer faithfully. Nothing is more useful in the management of coolies than a good knowledge of their language (Tamil). Many men think that they know enough Tamil when they can make a few brief orders intelligible to their own coolies, though they may be unable to understand more than half of what the coolies say to them, and though strange coolies receive their remarks with the stare and grunt which are so very exasperating. A Creeper should not rest satisfied till he can converse freely with any Tamil, or even with a Sinhalese who speaks Tamil, on any ordinary topic. So much for the Creeper's work, now for his prospects.

The chances of making money in tea grow less year by year. Fine fortunes have certainly been made with it, and the writer has known men who, by investing a few hundred pounds, have found themselves after ten years, or even less, in possession of properties bringing in a clear profit, of between £1,500 and £2,000 a year. At the present time, however, land has risen so enormously as to greatly reduce the possibility of making large profits. The salaries of superintendents, also, owing to the ease with which a knowledge of tea planting can be acquired, and the rush of Creepers, tend to become less and less. If a Creeper can, after a year or two of probation, secure a billet worth 200 rupees a month, he will have done well, and it may be years before he can get anything better. As a rule, estates which belong to non-resident proprietors or to companies are not left entirely in the hands of superintendents, but are inspected periodically by planters of ability and experience called visiting agents. The appointment of visiting agent to a large group of estates is, of course a valuable one, but such posts can, naturally only be obtained by a favoured few, and are hardly likely to fall to the lot of the average "Creeper."—*Globe*, May 5.

PRODUCE AND PLANTING NOTES.

Peru and the Tea Trade.—As those interested in India and Ceylon tea are always on the look out for new markets, a forthcoming exhibition in Lima, Peru, should attract attention. There is some scope in South America for pushing the sale of tea. That the present Government of Peru is anxious to do all in its power to foster and extend the trade of the country is shown by its action in promoting a permanent Industrial Exhibition, which is to be opened at Lima this summer. In order to ensure the success of the undertaking, a section of the Exhibition Palace at Lima has been set aside specially for it, while the whole of the arrangements are in the hands of the Minister of Public Works. Goods

and exhibits from all parts of the world can be shown, and manufacturers in Great Britain are to be invited to send goods, the Government undertaking to admit free for six months all exhibits. Should any of our readers desire to be represented they should communicate at once with Mr. K. B. Crowe, Consul-General for Peru, 13, King Street, Liverpool.

THE PLANTING INDUSTRIES OF MEXICO.—At a recent meeting of the Mexican shareholders of the Mexican Coffee Trading and Planting Company it was mentioned that there are already 1,500,000 coffee plants in the company's nurseries, which will be ready for transplanting this year; 60,000 one year and a half old trees have been planted, and are in good cono dition. The American Consul at the City of Mexicd says, "That, striking as are the facts with regarto the increase of the cultivation of coffee and the growth in the United States of a great appreciation of the Mexican berry and its sterling qualities, these can be paralleled in many points by the development of Mexican tobacco." Although France has not profited commercially by this increase, it is only simple justice to say that it is due very largely to Frenchmen and to the exiles from Cuba whom they employed. "In a word," says Consul Crittenden, "Mexico is not only one of the coming coffee countries, but is also a ooming tobacco country. Mexico seems to be destined to wear the mantle of Habana in tobacco production, and once secured it is safe to predict that it will never pass away, for the soil of the tobacco region is so deep as to be practically inexhaustible, being from 8 ft. to 20 ft. in depth, and in some places even 30 ft. Moreover, its extent is probably one hundred times that of the Cuban tobacco region, when we take into consideration the fact that acre for acre the percentage of cultivated land at the present moment capable of producing tobacco of the very highest grade is greater in Mexico than it ever was in Cuba in its best days. We can from this easily see what will be the amount produced in the future. Mexico's resources in this direction are practically so great as to make it certain that it will become rich from its tobacco alone. No doubt the result will be finally to cheapen the Habana cigars, and put them within the reach of all."—*H. & C. Mail*, May 7.

MANURIAL EXPERIMENT WITH SWEET POTATOES.

As a specimen of the work done in Antigua by Messrs. F. Watts, Government Chemist and Mr. F. R. Shephard of the Schools, we quote the following in full with appended table:—

Seeing that the ash of the Sweet Potato is very rich in Potash and also contains a very fair proportion of Phosphoric acid, experiments were made in order to ascertain whether the application of these two constituents would materially increase the yield. Nitrogeon was not used, as in an adjoining field a crop of sweet potatoes had developed such a large amount of leaf and vine,—due as we suspected to an abundance of Nitrogeon—that there was some difficulty in securing a crop of tubers.

Four experiments were tried, the plots receiving

Sulphate of Potash
Superphosphate
Sulphate of Potash and Superphosphate
No Manure.

and each of these was repeated four times: the individual plots measured 100 ft. by 40 ft.

The variety planted was that known as the "Quildane," it was planted early in January 1896 and reaped in June and July. The manures were applied in January. The large potatoes sold at the rate of 3/ per 100 lbs. and the small ones at 9d per 100 lbs. realizing £13-6-0 per acre.

The weights of potatoes and the proportion of large tubers are given in Table XI from which it would appear that potash and phosphate, separately or combined, do not increase the yield of tubers in these soils.

RESULTS OF MANURIAL EXPERIMENTS ON SWEET POTATOES.

How Manured.	Group A. Yield of Potatoes. lb.	Per Cent Large Potatoes.	Group B. Yield of Potatoes. lb.	Per Cent Large Potatoes.	Group C. Yield of Potatoes. lb.	Per Cent Large Potatoes.	Group D. Yield of Potatoes. lb.	Per Cent Large Potatoes.	Total Yield.	Per Plot Average weight Potatoes.	Per Acre Average weight Potatoes.	Averager Per Cent Large Potatoes.
Sulphate of Potash ..	548	73·	915	82·2	1,068	83·2	900	87·9	3,431	85·8	9,343	81·55
Superphosphate ..	800	70·	924	90·8	1,111	87·4	1,045	83·2	3,880	970	10,563	82·84
Sulph. of Potash and Superphos. ..	862	74·7	885	80·3	932	85·7	1,015	85·5	3,694	921	10,142	81·55
No Manure ..	843	79·7	790	78·7	907	83·3	1,214	79·6	3,754	939	10,225	80·82

AGRICULTURAL-SCIENTIFIC EXPERIMENTS IN ANTIGUA.

(*Extracts from Report to the Colonial Secretary.*)

GOVERNMENT LABORATORY, ANTIGUA, Dec. 3rd, 1896.

These experiments are a continuation of those which have been carried on systematically since 1892, and consist in the application of known quantities of the commonly employed constituents of commercial manures, to small plots of canes; the experiments being conducted on both "plant" and "ratoon" canes.

The experiments with plant and ratoon canes may be classified as follows:—

(1) Experiments with Nitrogen, in which unmanured plots and plots receiving no nitrogen are compared with plots receiving varying amounts of Nitrogen in the form of (*a*) Sulphate of Ammonia, (*b*) Nitrate of Soda, (*c*) Dried Blood.

(2) Experiments with Phosphatic manures, in which the yields obtained from plots receiving (1) no manure and (2) no phosphates are compared with those from plots receiving varying amounts of phospates in several different forms

(*a*) as Superphosphate
(*b*) as finely ground Mineral Phosphate
(*c*) as "Double Superphosphate"
(*d*) as Basic Phosphate

(3) Experiments with Potash in which the yields from plots receiving (1) no manure and (2) no Potash are compared with those from plots receiving increasing amounts of Potash in the form of Sulphate.

(4) Experiments with various substances, as Sulphate of Lime, Sulphate of Iron, Sulphate of Magnesia, and Marl (carbonate of Lime).

We have now to ascertain whether phosphates, in which the soil is so deficient, and which are so essential to plant life, can be added in any manner which shall prove directly beneficial. It seems probable that Leguminous crops may be benefitted by the application, and that if green dressings of Leguminous crops grown with the aid of phosphates be buried in the soil, we may introduce phosphates in a useful form, while at the same time the soil will receive vegetable matter, (humus), which it needs to as great an extent as it needs phosphates. A series of experiments has been inaugurated on these lines.

One of the greatest differences between tropical and temperate agriculture is occasioned by the rapid decay of vegetable matter which goes on all the year round in the tropics; so that much more organic matter is required in the tropics than in temperate regions, in order to keep land under cultivation in good condition. Soils such as these must receive large amounts of vegetable matter to keep them fertile; this may be accomplished by heavy dressings of pen manure, of which the planter rarely has sufficient at his command, or by "green dressings," or by the application of "bush"—(small brushwood, twigs, leaves, grass, seaweed and such like—grown elsewhere and carried on to the fields there to be buried. This latter process however can only be carried out in situations where the requisite material is available; it is a common practice in Barbados and St. Kitts, where its value is recognised. Applications of this kind should be made some time before planting in order that the young crop may not be injured by the fermentation of a large mass of fresh vegetable matter, covered by a few inches of soil; and if even with this precaution there appears to be any danger, the soil in which the "bush" is buried should be stirred with the fork. This method of manuring may be made to convey to the soil all the mineral matter, including phosphates required by a cane crop.* * *

It will thus be seen that such a method of manuring if conducted with the proper precautions will supply in a useful form more plant food than is given by the usual applications of artificial manure, and in such a form as to greatly improve the condition of the soil. This is a method of manuring which we would urge planters to adopt more extensively where ever possible. Green dressing differs from "bushing" only in the fact that in bushing the plant food is brought from a distance and added to the field to which it is applied, thus increasing the store: though something of a similar nature takes place with green dressings which have a deep root range, for they bring plant food from depths greater than the cane roots ordinarily reach and in this way they may be regarded as bringing fresh food supplies to the field. In the case of Leguminous green dressings, the gain of Nitrogen due to the action of the micro-organisms of the root nodules must be taken into account, and renders the use of Leguminous plants preferable to others for this purpose.

FACTS ABOUT COFFEE RAISING IN HAWAII.

The coffee raising industry in Hawaii is yet in its infancy, but it pays from one to two hundred per cent. on capital invested, the coffee being of a superior quality and ranking among the best in the world.

A new coffee plantation will pay original cost and leave a good margin of profit by the end of the fifth or sixth year after planting.

Coffee is worth at present, at the plantation, from 15 to 16 cents per pound, while the annual cost of production averages only 7 cents per pound.

Good coffee land, with unexceptionable title, can be bought all the way from $5 to $100 an acre, according to location and condition, and one acre will grow 600 to 800 trees.

A coffee tree in full bearing will average from 2 to 3 pounds of coffee annually, according to age—the life of the tree being from 30 to 40 years.

Much of the labor incidental to the raising and preparation of coffee can be and is performed by women and children, which largely increase the available labor supply and reduces the cost of same.

The cost of clearing the land and preparing the ground for the plants is from $5 to $10 an acre.

The season for setting out plants beings in January and ends in September.

Coffee plants can be bought at the nurseries at from $4 to $6 a thousand. Plants raised from the seed require eight months' growth before they are ready for transplanting in the field.

If the soil is rich and deep, 600 trees to the acre is a sufficient number; results as regards production of the coffee berry have been found to be more satisfactory with this number than with a greater or less quantity of trees per acre

Among all marketable fruits, the growing of which is made accessory to coffee culture, the pine-apple is the most profitable, especially where the grower has cheap transportation to ports.

The soil and climate suitable for coffee are suitable also for tobacco, corn, beans and oranges, and in the lower lying districts for sugar cane, rice and most of the tropical fruits as well.

The altitude suitable for coffee is from one to three thousand feet above the sea.

The coffee districts are among the healthiets in the country, and the climate suitable for coffee is suitable also for persons accustomed to a temperate zone.

The wages in the principal coffee raising districts, according to official figures, average 50 cents to $1 a day.

The picking season for coffee commences about July and continues to the end of the year.

Every coffee planter should carry on, simultaneously with his main business, the raising of corn, taro and other vegetables. A few hogs and poultry should also be kept.—*Hawaiian Planters' Monthly.*

INDIA AND CEYLON TEA PLANTING INVESTMENTS.

Few people are aware that the tea industry of India and Ceylon is one the most important trades of the Empire, and probably the great majority will scarcely credit the fact that a sum exceeding £25,000,000 is invested in the growing of tea in these two British possessions alone. If to this be added the enormous sums employed in transport, distributed yearly in wages to Indian labourers, and contributed to the customs' revenue of the United Kingdom, to say nothing of the vast capital and organisation for the distribution of tea to consumers in connection with the trade, it is obvious that this commodity is one of the standard commercial factors of the Empire. We may further draw attention to its extraordinarily sound and progressive position. Eleven years ago, the proportion of tea imported from China into the United Kingdom was 59 per cent. of the whole, and the Indian and Ceylon teas supplied the balance of 41 per cent. In 1894 the imports of China tea were but 12 per cent, and of Indian and Ceylon tea 88 per cent, and the greater part of the tea trade of the world is yet to be conquered. The tea consumption of the world, excluding the East, is 450,000,000 lb. per annum, and of this 250,000,000 lb. were in 1896 supplied by British growers. The tea-growing industry is supported mainly by capital provided locally in India and Ceylon, which is a striking testimony to what is deemed in these countries its value as an investment, especially when it is considered that the return on capital invested is required

to be much higher in these parts of the East than it is in Great Britain. Usually when capital is sought in England in connection with tea plantations in the East, it is merely with the object of winding up some estate, and is almost invariably supplied by the big East Indian merchants, and those most directly connected with the industry, so that the ordinary public has small opportunity of sharing in its prosperity. It is only within the last few months that the financial newspapers have considered the tea companies worthy of quotation, and the returns of capital, even now, are much greater than in any other form of stable investment. This condition of affairs is likely to continue only until means are offered to the public of participating in this form of investment by the creation of more ready markets for the shares. That such steps will be taken, and shortly, is almost certain, and those who are interested at the outset are likely to reap a golden harvest. —*Limited Liability Review*, May 1.

THE INDIAN TEA CROP ESTIMATE.

A special telegram from Calcutta to our contemporary states:—"The first estimate of the crop is 156,669,000 lb., or about 8,500,000 lb. over the actual outturn of crop in 1896. Estimating the shipments to America, to the Colonies, and to outside ports, and local consumption, at 18,000,000 lb., there remains about 138,500,000 lb., for export to Great Britain." The *Pioneer* states:—"April witnessed the high-water mark in tea exports from Calcutta. The total exports for the past month amounted to 492,241 lb., the corresponding figures for the two past years being respectively 164,662 lb., and 281,253 lb. There was a sudden leap in the exports to Great Britain from 67,104 lb., in April, 1896, to 355,543 lb., in April, 1897, while the figure in 1895 was 246,313 lb. This April showed a slight falling off in the exports to Australia."

INDIAN PATENTS.

Applications in respect of the undermentioned inventions have been filed, under the provisions of the Inventions and Designs Act of 1888, during the week ending 8th May 1897:—

Improvements in Rotary Sifting Machines for Tea or other Suitable Substances.—No 178 of 1897.—Charles William Ansell, civil and mechanical engineer, proprietor, Ansell & Sons, Darjeeling engineering works, Toong, Bengal, for improvements in rotary sifting machines for tea or other suitable substances.

Improvements in or Connected with Means or Apparatus for Withering and Drying Tea or other Produce.—No 186 of 1897.—James Shannon Stevenson, tea planter, of Rothes, Hatton, Ceylon, for improvements in or connected with means or apparatus for withering and drying tea or other produce.

Specifications of the undermentioned inventions have been filed under the provisions of the Inventions and Designs Act of 1888.

Fertilized and Fertilizing Materials for Promoting the Growth of Plants.—No. 459 of 1896.—Charles Halford Thompson, F.R.H.S., colonel in Her Majesty's Regiment of Royal Artillery, Eastcliff, Teignmouth, in the county of Devon, for fertilized and fertilizing materials for promoting the growth of plants. (Specification filed 3rd May 1897.)—*Indian and Eastern Engineer*, May 22.

THE INDIAN AND CEYLON TEA TRUST COMPANY, LIMITED.

FROM THE PROSPECTUS.

The formation of the present Company has been suggested by the fact that, notwithstanding the established merit of the Indian Ceylon Tea Planting Industry, the Shares in undertakings connected therewith are, with few exceptions, not readily marketable.

The market for Tea Shares is restricted, owing to the Companies being generally of insufficient magnitude, and to their regulations and constitution (many being formed under Indian and Ceylon law) precluding them from recognition on the London Stock Exchange. Although they earn large profits and offer an excellent security, their Shares are often not immediately realisable, and transactions have to be the subject of special negotiation. This is the frequent experience of executors.

Under these circumstances the intervention of an investment Company, constituted in accordance with the Rules of the London Stock Exchange, and of sufficient magnitude to command the attention on the London Share Market, appears to be needed.

The Capital of the Company will be spread over a number of undertakings, and its Shares therefore offer to investors an opportunity of participating in the prosperity of the Tea Industry with a minimum of risk, and without the difficulty of realisation which has hitherto been experienced. The present prices of quoted Tea Companies show a return on Capital largely in excess of that which might be expected, considering the long established and second character of the Industry. Still larger returns are shown by the Rupee Capital Companies, in whose Shares there are no dealings in London and the amalgamation of which is contemplated by this Company, with a view to offering them for investment in this country.

To meet possible contingencies the Memorandum of Association provides for a wide sphere of operations, but it is not intended to travel beyond the limits of investing in Shares and Debentures and of subscribing and guaranteeing the issue of Capital of existing or new companies connected with the Tea industry, and of purchasing, consolidating and issuing as Limited Liability Companies, Tea Plantations, and small Rupee Capital Companies.

The Tea industry, well organised and controlled, is highly prosperous. The time and capital necessary to establish a tea plantation, tend to limit the business to highly responsible hands.

The market for the produce are also rapidly extending. The proportion of China Tea consumed in Great Britain in 1886 was 59 per cent, and of Ceylon and Indian, 41 per cent; in 1896 the proportions were China Tea 9 per cent and Indian 91 per cent respctively.

The tea consumption of the world, excluding the East, is 450,000,000 lb., and of this 250,000,000 lb. were in 1896 supplied by British growers.

The field for investment is large; the Capital embarked in Tea Companies is estimated to be at least £25,000,000, and the Directors having intimate associations with the East, and the Tea industry in particular, are in the best position to obtain information as to the value of any securities which may come before them.

AN AMERICAN TEA DUTY.—We should not regard an import duty of 5d per lb. (if actually passed) as prohibitory for the United States, provided—as we trust and believe—corresponding imposts are to be laid on coffee and cacao. An advantage to Ceylon and India is that the higher the tea duty, the more it should tell against the cheaper commoner teas of which China and Japan supplies the larger portion. The duty will make up so large a proportion of the retail price in future, that it should be thought a small matter comparatively to give 2d to 3d extra per lb. to get a really good tea. The next question is what will Canada do? Hitherto the Dominion has charged 10 per cent *ad valorem* on teas brought through the States, while direct shipments were admitted duty-free.

Correspondence.

To the Editor.

THE CULTIVATION OF "VANILLA."

Seychelles, Feb. 18, 1897.

SIR,—Knowing no one in Ceylon, I am taking the liberty of addressing you to ask, can you put me in the way of obtaining information as to the cultivation of vanilla in your island? I have occasionally seen Ceylon vanilla, mentioned in Brokers' reports—so suppose a little is grown. What I most desire to know is, could one obtain cuttings of the vine to start new plantations? Has the fungus yet attacked your plants in Ceylon?—I am, sir, yours faithfully,

F. H.

[We referred the above queries to one of the most competent practical authorities in the island—Mr. W. H Wright—and have got the following reply:—

"I have grown vanilla since 1841 (when I was at Peradeniya) and am still cultivating it in a small way at Mirigama. In 1841 I sent some to England through Messrs. Baring Brothers. I got R55 per lb.—the price of it just now is R7·50 per lb. I can supply cuttings for a new plantation, say, to cultivate 10 acres at R15 per 1,000 cuttings. I am glad to say that I have never seen fungus attacking vanilla plants. I find that vanilla may be cultivated partially under shade, allowing it to grow on Dadap or Eremodo trees planted 30 feet apart and intervening on stumps. The best manure for vanilla is refuse coir-dust which can be had any quantity for nothing, any one who wishes to go in for vanilla cultivation, I will be glad to show them the mode of cultivating it on this estate."

—ED. *T.A.*]

TEA PLUCKING AND PRUNING &c: A LETTER OUT OF DUE SEASON.

KELANI VALLEY.

(1) Would you say how far you think Coarser Plucking of Leaf may have had to do with it?

Coarser plucking is the main cause, and this not voluntary but from larger area to pluck and limited labor.

(2) Or the more prevalent attention to Manuring Tea?

Manuring brings the larger yield but does not bring the coolies to pluck it.

(3) Or severe Pruning—cutting the bushes too far down?

Severe Pruning gives a weaker liquor and thus for a time reduces the value.

(4) Or less attention to careful Preparation in the Factory?

No, as much attention as ever is paid to manufacture. Given *ample labor* and ample Factory room and careful plucking, as good teas can be made now as those of the best years.

(5) How far Shortness of Labour Supply has affected your work in field or factory?

Affected both.

(6) Any other cause that strikes you—apart from (7) Overproduction and Increased Supply in Competition at the Sales?

The Home value of equal Teas of 1893 and 1897 is a very great factor, teas of equal make and look are now sold for 50 per cent less.

OLD PLANTER.

"ACACIA DECURRENS."

DEAR SIR,—In a controversy some years ago, I collapsed when after having received seed from Australia repeatedly of A. Decurrens and all the plants derived therefrom proving decurrent (althoug the color of the bark differed greatly among plants from the same lot of seed, the bark was mostly a pretty purple; but there were plants with bark of all shades of green). Yet there were local writers who argued that A. Decurrens was not decurrent; named I suppose on the same principle that the earwig is said to be named, *i.e.*, one was never yet known to enter a person's ear.

Possibly you will be surprised at the number of varieties of a de-currens (over 70) yet please note that without exception all are decurrent. If some public-spirited merchant would take the trouble and go to the expense of sending a shipment of the bark to England, it might lead to a new and profitable industry in Ceylon. The result of my own experiment although the analysis turned out so good, and the London valuation so high, and the yield of bark so encouraging: was that the proceeds of the bark in London only covered the expenses after it was delivered into the merchants share in Colombo.

It cannot be so in Australia for the bark is selling at £5 per ton at the shipping post. My parcel being a small one I based the above calculation upon the cost of drying, packing, and shipping charges on Cinchona bark in Colombo. If it can be done for much less, then it is a pity that no merchant came forward to say so. If a decurrens bark is worth £5 per ton at the shipping port in Australia, one would think it would be worth as much in Colombo. The question might be revived. Around Nuwara Eliya, in particular, what a grand thing for the estates to be able to supply themselves with fuel from about the quickest-growing tree we have; and at the same time to harvest a valuable commercial product from the same trees.—Yours truly,

T.

THE CULTIVATION OF RHEA FIBRE.

Kandy, May 24th.

SIR,—I enclose for publication copy of correspondence received from the Rhea Fibre Treatment Company, Limited, London, on the subject of cultivation, decortication and baling of rhea, and the subsequent treatment of the ribbons by the Gomes's process, and offering £10 a ton delivered in London or Liverpool.—I am, sir, your faithfully,

A. PHILIP, Secretary.

(*Copy.*)

Piccadilly Mansions, 17 Shaftesbury Avenue, W. London, April 2nd.

Messrs. The Planters' Association of Ceylon, Kandy, Ceylon.

DEAR SIR,—We have had forwarded to us a copy of your 43rd Annual Report, for the year ending 17th February 1897, and we read with great interest the paragraph therein relating to Rhea Fibre.

We have pleasure in sending you copy of a pamphlet dealing with the cultivation, decortication and baling of rhea, and the subsequent treatment of the ribbons by the Gomes's process, compiled under the direction of this Company, which we venture to think you will appreciate.

You will note therefrom that for the purposes of the Gomes's process treatment, it is only necessary to strip the bark from the stems and to thoroughly dry it, and that no other manipulation or cleaning is necessary.

We are prepared to make contracts for regular supplies and we suggest that you should send to us at your earliest possible convenience, a 2 or 3 cwt. sample for testing purposes, and to form the standard of quality for future consignments.

The price which we were offering is £10 a ton, delivered in London or Liverpool, but in order to encourage cultivators, we should not mind paying a slightly increased price for the first and second year of shipments.

We can assure a market for large supplies, and we believe that we can co-operate to mutual advantage.

We shall be glad if you will reply to this by return, and you can either address us direct, or through Messrs. A. Whitley & Co. of Colombo. If you have any material ready for shipment, and can dispatch it to us at once. Kindly wire us using the "A.B.C. Code" 4th edition.—Yours faithfully,

(Signed) W. T. BELL, Secretary.

THE BULKING OF TEAS AND THE RUSSIAN DUTY ON TEA CHESTS.

Kandy, May 24.

SIR,—I enclose for publication copy of correspondence by the Ceylon Association in London with (1) the Tea Brokers' Association of London as to the necessity of all teas being properly "bulked" before being offered at public sale (2) the Board of Trade as to the duties charged on acme steel tea chests entering Russia.—I am, Sir, yours faithfully,

A. PHILIP, Secy.

(*Copy.*)

61 & 62 Gracechurch Street, E.C. London, 9th April 1897.

A. Philip, Esq., Secretary, Ceylon Planters' Association, Kandy, Ceylon.

DEAR SIR,—I have the pleasure to enclose for the information of your Committee copies of recent correspondence, (1) with the Board of Trade as to the duties charged on acme steel tea chests entering Russia, (2) with the Tea Brokers' Association of London as to the necessity of all teas being properly "bulked" before being offered at public sale.—I am, dear sir, yours faithfully,

(Signed) WM. MARTIN LEAKE, Secy.

(*Copy.*)

61 & 62 Gracechurch Street, E.C., 25th January 1897.

The Secretary of the Board of Trade, London.

SIR,—A firm exporting Ceylon tea from London to Russia writes as follows:—

We have recently made a shipment of Ceylon Tea to Russia of which 38 chests were acmes: on these the Russian Customs have charged duty as tin plates amounting to £6. 7s. 4d.

The acme chests are made of thin metal and have of late come into frequent use: the effect of charging duty on the metal chest as well as on the tea will be to exclude from the Russian markets the teas of those gardens that use metal chests.

Can you inform me in what way a representation on the matter can best be made, so as to bring about a change of practice?—I am sir, your obedient servant,

(Signed) WM. MARTIN LEAKE, Secy.

Board of Trade (Commercial Department), 7 Whitehall Gardens, S.W., 2nd February 1897.

SIR,—I am directed by the Board of Trade to acknowledge the receipt of your letter of the 25th ultimo, on the subject of the Customs treatment in Russia of metal chests containing tea when imported into that country.

The Board are in communication with the Foreign Office respecting this matter, and hope to be in a position to furnish you with a further reply shortly.

I am, sir, your obedient servant,

(Signed). W. GIFFEN.

Wm. Martin Leake Esq., Secretary of the Ceylon Association, 61 and 62 Gracechurch Street, E.C.

Board of Trade (Commercial Department), 7 Whitehall Gardens, S.W., April 5th, 1897.

Sir,—With further reference to your letter of the 25th January last and to the reply thereto addressed to you from this department on the 2nd February, I am now directed by the Board of Trade to forward to you for the information of your Association, the accompanying copy of a Memorandum from Her Majesty's Consul-General at St. Petersburg (which has been supplied to this Board through the Foreign Office) on the subject of the Customs treatment in Russia of metal chests containing tea imported into that country.—I am sir, your obedient servant.—(Signed). W. GIFFEN.

W. Martin Leake Esq., Secretary of the Ceylon Association, 61 and 62 Gracechurch Street, E.C.

Memorandum.

Tea when imported in large cases lined with tin and which are cut open for inspection at a Russian Custom house is dutiable at its net weight, and similarly as tea imported in lead casing the tin casing is not liable to duty.

Tea imported in small cases or canisters is likewise dutiable at its net weight, but the small cases or canisters are subjected to a separate duty as tin plate or R2·25 copecks gold per pound or when laquered R3, or painted and gilded R6 gold per pound. There are no specific orders for this practice which appears to be based only on the analogy applicable to the case and afforded by the orders of the Customs department of the 17th October 1883, and the 12th June 1890, which direct that tin cases containing weaver's reeds, leather belts, sewing needles, aniline dyes and other manufactured goods shall, on importation pay a duty of R2·25 copecks gold per pound under section 154 of the Customs Tariff.

(Signed) JOHN MITCHELL.

St. Petersburg, March 19th, 1897.

Circular letter referred to.

61 & 62 Gracechurch Street, London, 9th April 1897, E.C.

Dear Sir,—A complaint has reached the Tea and Produce Committee from the London Wholesale Tea Dealers' Association that,

"The requirements of Clause 4 in the conditions of public sales which states that each parcel has been inspected before sale, and has been bulked (if necessary) have not been carried out in a great many cases."

The Committee regrets to find on enquiry that this complaint is not altogether unfounded.

Inasmuch as careless or neglected bulking of necessity involves unreliable samples, the complaint is undoubtedly a serious one.

I am directed therefore to invite the attention of importers of Ceylon tea to the imperative necessity for complying with the conditions of the clause referred to, so that buyers may operate with the fullest confidence in the future.—Yours faithfully,

(Signed) WM. MARTIN LEAKE, Secretary.

(*Copy.*)

The Tea Brokers' Association of London,
Mincing Lane, E.C., 26th March 1897.

W. MARTIN LEAKE, Esq., Secretary, The Ceylon Association in London.

TEA BULKING.

DEAR SIR,—I am instructed by my Committee to send you the enclosed copy of letter received from the London Wholesale Tea Dealers' Association.—I am Dear Sir, yours faithfully, (Signed) W. G. PRICE, Secretary.

London Wholesale Tea Dealers' Association,
17th March 1897.

To W. G. PRICE, ESQ.

TEA BULKING.

DEAR SIR,—At a meeting of my Committee held on Monday, the following resolution was unanimously passed, namely:—

The Committee find that the requirements of Clause 4 P.S.C. which states that each parcel has been inspected before sale, and has

been bulked (if necessary) have not been carried out in a great many cases and they must insist on this condition being faithfully observed.

In the event of any parcel not having been bulked in the London Warehouse, a statement to the effect that it has been bulked in India or Ceylon and inspected in London should be inserted in the catalogue.

I beg to request you will be good enough to bring this subject before your Committee, with the view of preventing any further inconvenience which now too frequently results from the irregularities mentioned.

I am &c., (Signed) W. SEDGWICK, Hony. Secy.
The Secretary, Tea Brokers' Association of London.

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61 & 62 Gracechurch Street, London, April 9th.
W. G. PRICE Esq, Secretary, Tea Brokers' Association of London.

DEAR SIR,—I have laid your letter of 26th March with its enclosure from the London Wholesale Tea Dealers' Association before the Tea and Produce Committee of this Association, and in reply I am to forward for your information and that of the wholesale Tea Dealers copy of a circular letter addressed to members of this Association and to other importers of Ceylon tea. My Committee hopes that there will be no further cause of complaint.

I am, dear Sir, yours faithfully,
(Signed) W. MARTIN LEAKE, Secy.

TEA IN RUSSIA.

Kandy, 2nd June.

SIR,—I enclose for publication a copy of the translation from a Russian newspaper received from Mr. Rogivue about Tea Cultivation in the Caucasus.—I am, sir, yours faithfully,
A. PHILIP, Hon. Secy., C. P. A.

Translation from the *St. Petersburg Herald*, 16/28 February 1897. Forwarded by Mr. Rogivue.

TEA CULTIVATION IN THE CAUCASUS.

There are about 140,000 tea-bushes in the plantation of the Crown Domains, of which 45,000 are from seed obtained from China through the commission which was sent there.

The planting was most carefully done, and the growth of the bushes has been excellent. Experienced tea growers from China and Japan, as well as an Englishman, who has been engaged in tea planting in India, were entrusted with the planting and treatment of the bushes. Next season's planting is to be done with 200 lb. (Russian) or about 30 maunds seed from China. On K. S. Popow's estates in Tschakra, Kaprischosts and Ssudidawri about 20 Desjutins (about 70 acres) have been opened in tea, and the number of bushes is estimated at about 70,000 of 1 to 3 years' growth and upwards.

On A. A. Ssolowzow's estates about 10,000 plants have been put out, Here the cultivation of tea was first introduced and some of the bushes which are from 7 to 9 years old have already given good crops.

It is however to be regretted that the inhabitants of these districts do not take to the cultivation of tea, although it grows very well in Givira, Minereha and S. W. Imeritia and many of the Agricultural Schools in the town have well established bushes in their gardens.

MYROBALAMS AND ARALU NUTS.

Haputale, June 3.

DEAR SIR,—Being a reader of your *Tropical Agriculturist*, I notice in the market rates quoted of Ceylon produce, that Myrobalams are 3s to 7s. Is this per cwt. or per bushel? [Per cwt.—ED. *T.A.*] I should be very much obliged if you could give me any information regarding the licence you have to pay for gathering Aralu-nuts, and what merchants in Colombo and London purchase this product?—Yours faithfully, H.C.A.

[Aralu-nuts are gathered chiefly in the Uva Province, and the Forest Department sells the rent or right of gathering yearly—in 1893 it fetched R4,000; 1895, R1,000 offered.—E *C.*] *O.D.*

FLIGHT OF BUTTERFLIES NORTH OF KANDY.

Oonoonagalla, Madulkele, 9th June.

DEAR SIR,—An immense flight of butterflies is passing due south today. The flies we usually see at end of April. I enclose several specimens. Sky clear with light breeze from south-west. We had a little south-west wind with showers a few days ago; but the weather today is more like the beginning of April than the 9th June.—Yours truly, M. H. THOMAS.

[The butterflies are of a type common in such flights even on the sea-coast; but November-December is the usual season for "the migration of butterflies"—in the teeth of the north-east monsoon—and we cannot recall such an experience as the present one in June? It will be seen that he flight is reported from Kotmalie and Dimbula as well—ED. *T.A.*]

ALBIZZIAS IN B. C. AFRICA.

Dunraven, Estate, Mlanje, 14th March 1897.

Dear Sir,—As several planters have been sending samples of our local trees, which answer somewhat to the description of Chikwani to me for identification (but all have turned out to be different), I write to inform them how they can unmistakably identify Albizzia Fastigiata Oliv. unless it turns out that they have found some other Albizzia in the country, which I have searched for and failed to find.

When the roots of Chikwani are examined you will find little lump-nodules about the size of small white beads which when squeezed exude a white milky substance, sitting quite unmistakable and prominent along the fibrous roots; not a rough lumpy surface on the bark as one gentleman was sure were the nodules referred to. They are the same as those attached to the Albizzia Moluccana plants (although I have no plants myself) I am quite certain the nitrogen fixers will be found by those who have purchased seed from the A. L. C. and grown the plants.—I am, etc., HENRY BROWN.

P. S.—Chikwani does not seem to be in Blantyre or Zomba for I have had samples of the nearest trees to it but not the identical trees neither are they Albizzia.—*Central African Gazette.*

[What does Mr. Brown, formerly of Matale, mean by coupling A. Moluccana with "nitrogen fixers."—ED. *T.A.*]

DEAFNESS. An essay describing a really genuine Cure for Deafness. Ringing in Ears, &c., no matter how severe or long-standing, will be sent post free.—Artificial Ear-drums and similar appliances entirely superseded. Address THOMAS KEMPE, VICTORIA CHAMBERS, 19, SOUTHAMPTON BUILDINGS, HOLBORN, LONDON.

COFFEE PLANTING IN THE PROVINCE OF COORG.

We have before us the Administration Report of the Province of Coorg.

The special interest which Coorg possesses for us is connected with its cultivation of our old staple. It was once a rival of ours in the production of coffee, and now that we have passed literally to the sere and yellow leaf, Coorg for some time supplied us with what was believed to be fungus-proof seed. It is the fault neither of Coorg nor its coffee, that the life history of *Hemeleia vastatrix* does not encourage the hope that any variety of the coffee tree or coffee bush can resist the fatal attentions of the insidious pest. Whether in Coorg itself the coffee bush is free from the fungus, the Report does not state. We doubt if it is; but there is no diminution there in the acreage under cultivation. The total area of land under coffee had increased, for the period under report, from 84,592 acres the previous year to 84,991 acres. The increase of 399 acres is not much; but what is remarkable is that this product covers the largest acreage of all, so far as appears. Even the wet lands under rice cultivation fall short of the acreage of coffee land by 8,000 or 9,000 acres; while dry lands under dry and garden crops cover only little over 1,500 acres. Nor is it stated that the figures relate chiefly to abandoned land, as we find the whole extent assessed—424 European estates covering 30,979 acres and 7,094 native estates 54,012; but the yield, if the official figures are correct, must be very disappointing. The coffee crop for the year, though 800 tons larger than for the previous year, amounted to only 3 650 tons which, according to the familiar local terms, are equal to 14,6 0 cwt.; and that works out one-sixth of a cwt. an acre. It cannot possibly pay to cultivate coffee for such returns; and we suspect that the assessment continues to be levied on the full acreage of estates, the better part of which has gone out of cultivation. If so, we cannot but condemn the heartlessness and shortsightedness of a policy which does not take account of the ability of the land to bear the burden placed on it. Even taking the European estates alone, which represent the smaller acreage, the total outturn would give less than half a cwt. to the acre! We are not surprised, in view of these facts, to learn that a movement is on foot to place the abandoned coffee estates on the Sampaji Ghat under tea; but, while sympathising with those who feel compelled to betake themselves to a new product, we are bound to note that the circumstances under which this island resorted to tea were different. Then tea sold from 2s to 3s a lb.; British grown teas formed an inconsiderable fraction of the world's production; and the supply was not in excess of the demand. Now, tea sells at a lower price than it ever did—1s would be a high average; the current prices leave only a small margin of profit to the majority of estates, though well-situated fertile plantations still yield gratifying returns; and the supply being in excess of the demand, there is the constant apprehension of still lower prices. It is often better to bear the evils we know than to fly to others we wot not of. Some of the Coorg lands—the extent is not specified—appear to be under cardamoms; and that is a product for which the prices and the demand are encouraging; but it chiefly affects ravines and moist situations; and spices can very easily be overdone, as many found to their cost here with cinnamon.

PLANTING NOTES.

BEES' VENOM AS A REMEDY.—A novel undertaking in the manufacture of drugs has been begun by two young Pennsylvanians, who have commenced the extraction of the poison from honey-bees. They have two different ways of collecting their crop of venom. In the first, the bees are caught and held with the abdomen in a small glass tube until the poison sacs have been emptied. In the second, they are placed in a bottle on wire netting, and enraged until the tiny drops of venom fall into the alcohol which fills part of the bottle. This venom is said to be a remedy for cancer, rheumatism, snake-bite, and a hundred other ills of humanity.—*Chemist and Druggist*, April 24.

THE IMPORTATION OF INDIAN TEA AT THE PORT OF BATOUM.—The Indian Tea Association (London has addressed the following letter), through the secretary, Mr. Ernest Tye, to the Secretary of State for Foreign Affairs: "I am desired by the committee of this association to address your lordship with reference to the prohibition issued by the Russian authorities against the importation of Indian tea at the port of Batoum, which was referred to in a telegram from the Secretary of State to his Excellency the Viceroy of India under date March 10, as follows:—'Batoum: Importation of Indian Tea Prohibited.'—The port of Calcutta, from which Indian tea is shipped is, and has been hitherto, entirely free from any attack of plague, and is very distant from any place where the plague prevails, and my committee would respectfully invite your lordship's attention to tho fact that the prohibition is regarded in India as the result, not so much of sanitary precaution, as of commercial jealousy of India and its industries. My committee fears that unless prompt measures are taken to have the prohibition removed other nations will follow the evil examp'e set by Russia, and that grave injury will result to the Indian tea industry. I am therefore directed by my committee to beg that your lordship will be good enough to take such steps as may seem to you expedient, with a view to bring about the removal of the restriction against the importation of Indian tea at Batoum or elsewhere."—*H. & C. Mail*, April 23.

HEMP CULTIVATION IN BOLOGNA.—One of the most important agricultural products of the provinces of Bologna and Ferrara is hemp (*Cannabis Sativa*). Bologna hemp is generally manufactured into yarns and canvas. The Ferrara quality is principally used for rope making. The former is a finer fibre than the latter, but not so strong; they are both however held in high esteem in textile centres abroad, according to the United States Consular Agent at Bologna, chiefly in Germany, France and Spain. The cultivation of hemp has greatly developed in Bologna and Ferrara, owing to the favourable conditions of the climate and soil, which are not easily found in other countries. Hemp may be cultivated between the equator and 60° latitude. Chemically the land must be siliceous, argillaceous, calcareous and rich in azote. Physically it must be soft, fresh and deep. In addition the land must be abundantly manured. Sowing generally takes place in the spring, owing to the necessity of a temperature of 46·4° Fahrenhit, and a moderate degree humidity. It is preferable to sow by machine, this system saving seed, and the sowing being much more regular. The land must be previously deeply ploughed. After sowing the land requires to be hoed, and much other work is necessary, such as the extirpation of weeds, &c., in order to obtain an abundant crop. The crop ripens in August or September according to the weather. It consists of stalks about three metres long. These stalks are placed in bundles and put into ponds expressly constructed, where they remain about a week. They are then dried and scutched by means of a complicated process, which produces the fibre ready for market.—*Journal of the Society of Arts*, April 9.

COFFEE PLANTING IN NYASSALAND.

Mr. G. M. Crabbe formerly of Great Western and afterwards El Teb, which place he left to superintend the Nyassaland Coffee Co's. property in Milanji, Central Africa, and quitted the place on medical advice, being attacked many times with fever, and who arrived here the other day, has left for upcountry. According to particulars afforded by Mr. Crabbe to our contemporary, he had not been in Milanji more than three months, when two of the Buchanan Brothers, whose place was at Blantyre, died, and the third brother is now dead also. They were the leading men in the country, possessing a thousand acres or thereabouts. John Buchanan had been out in Central Africa about 18 years, connected with the Bla ntyre Mission Station. He started the planting down there, but soon after Mr. Crabbe's arrival, John Buchanan and his brother Robert died within two months of each other. Planters in that part we are constantly falling ill with fever, and many die. The population of white men in Milanji was only seventeen, including the Administrator and his assistant. When the place is fully opened and developed, Mr. Crabbe thinks it may become healthier, but at present it was a most dangerous country. The country is undulating, like the Assam district, and it has a rainfall of about eighty. The temperature is cool and equable, but the place is particularly unhealthy from the middle of November to the end of February, which is the planting season. The pioneer of Mlanji is Mr. Henry Brown, who was formerly an Inspector in the Ceylon Police. When he left here, in 1890 or 1891, he went to Central Africa in connection with the work proceeding at the Lakes; but in a short time he took to coffee planting. When he left the Company's property they had 240 acres opened, and last year they opened another ten acres, making 250 acres opened, but another 250 is to be opened this year. The jungle which has to be cleared is very heavy, but the soil is by a long way the best soil that can be found there, and is very dark-red in colour. Mr. Crabbe's place has been taken by Mr. Moggridge, who was formerly with Mr. Cotton, on Dammeria, Passara. He has with him as assistant Mr. Robin, who also hails from Ceylon, having been a planter with Mr. Metcalfe in Pundaluoya. They came out to Mr. Crabbe a year ago last May. Robin has suffered very badly with fever. Five miles off Mr. Crabbe's place was an estate belonging to Mr. Moir, who was formerly Manager of the African Lakes Company. He had about 180 acres opened in coffee and on the other side was Mr. Henry Brown who had about 200 acres opened. Mr. Crabbe had some coffee in full bearing, and he had also a few tea bushes, but they were not a good jat. Then about ten miles off Mr. Bradshaw had about 180 acres. His was a very good place. His oldest coffee was about five years of age, and he got a crop of 30 tons last year. Then, there was a small estate of 60 acres belonging to a Mr. Simpson, who, in addition to coffee, has gone in for a few native products. That is about all. There were no factories, and all the pulpers are worked by hand with the exception of those at Mr. Moir's place who has the only water-wheel in the country. But the great thing they have to contend against, said Mr. Crabbe, was the want of good seed. The coffee is of the Arabian sort, but this want is greatly felt, and something will have to be done with regard to getting better seed. The Nyassaland Coffee Company *did* try to introduce Brazilian seed, but it didn't answer—it failed to germinate. All the seed they had was got locally. No coffee seed from India or Ceylon is allowed into the country on account of leaf disease, nor is tea seed allowed, though some sent by Mr. Carson from Ceylon managed to get in and it turned out a failure. It was Indian seed; but it got in as the Commissioner at that time was anxious it should be started. The coffee is planted under shade there. The administration seem to have done very little for the country as far as helping the planter goes. There is a great want of roads and transport facilities. All produce was sent to Chiromo on the river Zambesi, 70 miles away on niggers' heads, and though there was a river near, and it led to Chiromo, it was not navigable. From Chiromo the produce went to Chinde; Beira, of course, being the port of export. Labour was plentiful, with the exception of the four wet months. That time the natives mostly employ in working their own gardens. A lot of labour comes from Lake Nyassa, the people coming down a distance of over 200 miles. The labourers were paid in calico, three shillings a month, so they were cheap. The local labourers only got two shillings' worth of calico a month. They had no trouble either with advances or tundus.

KOLA.

THE AMERICAN MARKET.

The demand for kola in the United States has increased very materially within the last three years. In fact, previous to 1894 there was practically but little used. At the present time, American firms are among the largest consumers.

African and Jamaican Kola.

The introduction of Jamaica kola in this market dates from my visit to your island, in the winter of 1893-94. Since then Jamaica kola has had a more or less ready sale at a good price. It is a mistake, however, to suppose that Jamaica kola will sell at a price above that of any other kind and it is especially a mistake to think so when Jamaica kola is badly handled as to its gathering and shipment.

At the present time by far the largest amount of kola consumed in the United States comes from Africa, and probably about ten pounds of African are sold to every pound of West Indian. There are several reasons for this. First—African kola is better known having been introduced into the European markets two or three centuries ago. And, secondly, the African kola is much better cared for in its gathering and shipment. As an illustration: I have a stock of African kola nuts fully one year old, and the nuts are in the same condition as they were when first picked. Whereas the first specimens of Jamaica Kola as prepared for the market deteriorate on the five and six days' voyage from Jamaica to New York.

Through your Society and the Botanical Department and by the aid of the public press, I have endeavoured to induce your people to prepare it in a proper manner. While I have practically succeeded, the experiment so far has been an expensive failure.

Hints for Shippers.

The main trouble is that your people wait until the kola is partially dried and rotted upon the tree before they pick it. Whereas they should be picked as soon as the pods are full, before they break open and dry. Next, as soon as taken from the tree, they should be taken from the pod and the thin outer skin, which is loose and pulpy, should be carefully washed off, so that this entire coating is removed. The nuts may then be shipped at once, packed in barrels—that is, if they are sold to the user who will use at once. But if they are to be sent on consignment or if they are to be kept for any length of time before using, they should immediately be washed and covered completely and tightly with wetted leaves. The best way is to line a basket about one inch thick with heavy green leaves which are thoroughly wetted. The lining should be complete, without any cracks or breaks. The nuts should be picked over; if any are bruised, broken or over-ripe or starting to rot, they should not go into the collection. They should be carefully laid in so as not to break or bruise them, or split them open. They may then be sprinkled down with water, and carefully coverved with wetted leaves. Nuts thoroughly done in this way will keep for at least a year. In fact, I have had them for 18 months. I have thought that I would ship to Jamaica a basket of nuts as prepared in Africa for shipment, that your people might see exactly how it is done. It is a simple matter and yet one which I have been unable to get your people to accomplish,

The principle involved is, that mouldy nuts, over-ripe or a few rotten nuts, spoil the whole of the shipment and that the outer pulp which is easily decomposed, shall be washed off. Also that the nuts shall be covered so that the mold germs from the air or external objects shall not reach the nuts. Also that they do not dry out. At the same time air must reach them, but through the filter of leaves. I have received nuts from Jamaica packed by every method except this one. In cases where I was able to use the nuts at once, it did not make so much difference, but if you are going to supply them for the general market, you will have to have them more perfect.

The Future of Kola.

As to the consumption of Kola. Kola has been brought to this or any other market in sufficient quantities prepared in the right way, to supply the demand for a prepartion of kola to take the place of coffee. What is now consumed is for medicinal preparations, and for this purpose there is plenty to be had at rather low prices, considered as a drug. But when we come to consider it as an article of food as beverage, that means millious of pounds and the transportation from Africa would preclude the possibility of its coming into competition either with tea or coffee.

Dealers and manufacturers have therefore contented themselve so far to supply only medicinal preparations awaiting such time as they can be assured that they will have a supply that can be depended upon, prepared in the right manner, before placing the beverage upon the market. Green nuts are in the greatest demand at the present time and the demand is constantly increasing. In regard to the drying of the nuts, even African dried are very unsatisfactory for beverage purposes. For the purpose of which I speak, none of the nuts dried either in Jamaica or elsewhere are at all satisfactory. In fact this is what has precluded its adoption. There is a proper method of drying them, of which I may send you information later.

It is difficult to tell the amount now consumed in the United States as they are arriving from all sources in such variable quantities. I have a knowledge of one concern that used about 100,000 lb. last year.

There are many concerns who use a considerable amount and the demand is rapidly increasing. Further than this, I am not able to state.

T. B. KILMER.

New Brunswick, N. J., 17th March, 1897.
—*Journal of the Jamaica Agricultural Society.*

THE INDIAN AND CEYLON TEA TRUST CO., LIMITED.

This Company, the prospectus of which has now been before our readers, introduces us to a new departure in Limited Companies connected with tea. It seems to us that full justification for the formation of the Company is afforded in the prospectus; for there can be no denial of the number of small yet prosperous Tea Companies in India and Ceylon whose shares are scarcely known beyond a limited circle. But we regret to find a section of the London press by no mean favourable to the new Company. Here, for instance, is what the *Daily Chronicle* of 12th May has to say on the subject :—

THE INDIAN AND CEYLON TEA TRUST COMPANY, LIMITED.—Capital of £250,000 in 49,800 ordinary shares of £5 each, and 1,000 deferred shares of £1 each. The present issue is 30,000 ordinary shares and 1,000 deferred shares. We do not like the principle of deferred shares, which in this case are entitled to divide the balance of profits equally with the ordinary, after a dividend of 7 per cent. has been paid on the ordinary shares. This Company is formed on the usual principle of trust companies of spreading the risks over numerous undertakings, but it has usually been the case that, as now, prices are high when the purchases are made, and there is always the possibility that the securities may be selected to suit the interests of the sellers rather than the buying company. We should not advise our readers to subscribe.

Of course, in this or any other Trust Company, everything depends on judicious management, and therefore on the character, judgment and experience of the men directing its business. In the present instance, we should say, these requirements, both as regards India and Ceylon, are well fulfilled; and we do not see why the "Indian and Ceylon Tea Trust Company, Ld." should not have a long and prosperous career and prove a great convenience and benefit to the shareholders in the smaller Tea Companies of both countries.

TEA AND COFFEE.

The advocates of the Free Breakfast Table had an opportuuity last night of once more bringing their plausible but impracticable doctrine before the House of Commons. Mr. Arthur O'Connor moved to reduce the tea duty to 2d in the pound, fortifying his proposal by the usual arguments, which, however, failed to convince the House. The Chancellor of the Exchequer had a complete answer to the suggestion in the fact that he cannot afford to sacrifice a tax which brings in £1,800,000 a year, but he also pointed out the injustice of giving up such a source of revenue at a time when direct taxation has become an oppressive burden. There can (says the *Globe*) be no doubt that whenever Sir Michael Hicks-Beach or a successor in his office finds himself in the happy position of being able to reduce taxes the income-tax payer has the first claim to relief. Nothing could be more impolitic either, than to diminish the yield of profitable indirect taxes which experience has shown cannot be again augmented in time of need. Sooner or later the removal of two-pence from the tea duty would inevitably mean the addition of a penny to the Income Tax. Nor is there the slightest necessity for the reduction. Tea is cheaper than it ever was, not because the duty was lessened a few years ago, but because of the enormously extended area of tea-cultivation in India and Ceylon. There is reason to believe that the consumer was but very slightly benefited by the change, and another reduction would probably do him no more good. Something might be said for increasing the duty on coffee, the wholesale price of which has declined so enormously that the consumer could hardly be called upon to share it, but unfortunately coffee is ceasing to be a necessary of life to the masses. Its consumption is steadily growing smaller year by year. That is largely due, we dare-say, to the fact that few English people know how to brew a cup of coffee properly. But whatever the explantation, the decline is patent, and there is no likelihood that it will be arrested.

MEDICINAL PLANT CULTURE IN NICARAGUA.—U.S. Consul Thomas O'Hara, of San Juan del Norte, Nicaragua, has transmitted to the Department of State the translation of a decree signed by President Zelaya, having for its object the encouragement of the cultivation of the vanilla bean, and of the plants from which the balsams of tolu, copaiba and others are extracted. The decree provides that persons cultivating one thousand or more plants of vanilla or balsam shall be entitled to a premium of 10 cents for each plant, and shall be allowed to acquire plots of government land not exceeding 346 acres on exceptionally favourable terms.—*Chemist and Druggist*, April 17.

COLOMBO PRICE CURRENT.

(Furnished by the Chamber of Commerce.)

Colombo, June 29th, 1897.

EXCHANGE ON LONDON: CLOSING RATES, *Bank Selling Rates*:—On demand 1/2 7-8 to 29-02; 4 months' sight 1/2 29-32 to 15-16; 6 months' sight 1/2 15-16 to 31-32 *Bank Buying Rates*:—Credits 3 months' sight 1/3 1-16 6 months' sight 1/3¼; Docts 3 months' sight 1/3 3-32; 6 months' sight 1/3 5-32;

COFFEE.—Plantation Estate Parchment on the spot per bushel R15·75 Scarce Estate Crops in Parchment, delivery no quotations. Plantation Estate Coffee, f.o.b. on the spot per cwt. R85·50 Scarce Liberian parchment on the spot per bushel, R7·00. NativeCoffee f.o.b. per cwt. R62·00 Nominal no inquiry.

TEA.—Average Prices ruling during the week Broken Pekoe, per lb. 40c. Pekoe per lb. 34c. Pekoe Souchong per lb. 24c. Broken mixed and Dust, per lb. 18c. Averages of Wednesday's sale.

CINCHONA BARK.—Per unit of Sulphate of Quinine per lb 3¾c.

CARDAMOMS.—per lb, R2·.75

COCONUT OIL.—Mill oil per cwt. R13·00. Dealers' oil per cwt. R13·00 Coconut oil in ordinary packages f.o.b. per ton R295·00

COPRA.—Per candy of 560 lb. R40·50

COCONUT CAKE: (Poonac) f.o.b. (Mill) per ton, 80·00

COCOA.—Unpicked and undried, per cwt. 40c.

COIR YARN.—Nos. 1 to 8 { Kogalla R18·00 / Colombo R16·50

CINNAMON.—Nos. 1 & 2 only f.o.b. 67c.

Do Ordinary Assortment, per lb 62c.

EBONY.—per ton R185 Govt. sales on.

PLUMBAGO:—Large Lumps per ton, R340

Ordinary Lumps per ton, R330

Chips per ton, R175. Dust per ton, R130

RICE.—Soolye per bushel, { R3·75 to 3·85

„ per bag, R10·00 to 11·25

Pegu and Calcutta Calunda R10·00 to 11·25

Coast Calunda per bushel, R3·65 to 4·30

Muttusamba per bushel, R3·80 to R4·65.

Kara per bushel, R3·65 to 3·75

Rangoon Raw 3 bushel bag —R11·50

FREIGHTS.

Cargo.	Per ton London per str. s. d.	N. York per str. s. d.	Trieste per str. s. d.	Mar'lles per str. s. d.	Hamb', Bremen &c. s. d.
Tea	20/	32/6	22/6	25/	20/
Coconut Oil	..	32/6	22/6	25/	20/
Plumbago	17/6	32/6	22/6	25/	20/
Coconuts in bags	17/6	..	22/6	25/	20/
Other Cargo	17 6	..	22/6	25/	20/
Broken Stowage	10/	..	..	..	..
SAILERS.					
Coconut Oil	..	25/		..	..
Plumbago	..	25/	..	..	..

LOCAL MARKET.

By Mr. A. M. Chittambalam, , Baillie St., Fort.

Colombo, July 1st, 1897.

Garden Parchment :— Scarce per bushel

Chetty do :— (Nominal) R.13 25 to 13·50 do

Native Coffee:— R51·00 to 55·00

do f.o.b. do :— R62·00 to 63·00 do

Liberian Parchment, R12·50 per bushel (nominal)

do Coffee R63·00 to 64·00 per cwt

CARDAMOMS.— R1·50 to 2·50 per lb (nominal)

COCOA.—(nominal) R28·00 to 36·00 per cwt do

RICE.—Market is quiet :—

Kazla (Scarce)

Soolye (nominal) R9·50 to 10·50 per bag

Callunda (Scarce)

Coast Callunda (Scarce) 3·6? to 3·68 per bushel

Kara 3·62 to 3·75 do

Muttusamba 3·75 to 4·12 do

CINNAMON.—Quoted Nos. 1 to 4, at 61c and Nos. 1 and 64 cents per lb (nominal)

CHIPS.—R35·00 to 37·50

COCONUTS.—Ordinary R32 to 38 per 1,000 (nominal)

do Selected 40 to 44 do do

COCONUT OIL. 12·87½ to 13·0? per cwt do

COPRA.—Market steady :—

Kalpitiya R40 to 41 per candy

Marawila 37 to 39 do

Cart Copra 34 to 36 do

POONAC.—Gingelly 87·50 to 92·50 do ton

Chekku 95 to 100 do

Mill (retail) 70 to 75 do

EBONY.—quotations at R100 to R195 (nominal)

SATINWOOD.—cubic feet 2·00 to 2·25 do

HALMILLA.— do 1·25 to 1·50 do

KITUL FIBRE.—Quoted at R28·00 per cwt (nominal)

PALMYRA FIBRE.—Quoted nominally :—

Jaffna Black.—Clean (scarce)

do Mixed R17·00 to 18·00 per cwt.

Indian do R7·00 to 9·00 do

Do Cleaned 10·00 to 14·00

SAPAN WOOD.—Quoted 45·00 to 50 per ton

KEROSINE OIL—American 7·70 to 7·75 per case

do Bulk Russian 2·80 to 2·84 per tin

do Russian in Cases R5·90 to 5·95per case

KAPOK.—Cleaned f. o.b :— R28·00 to 30·00 per cwt

do Uncleaned (new) R4.50 to 5.50 do (nominal)

Croton Seed Scarce

Nux Vomica 2·50 to 3·00 do

CEYLON EXPORTS AND DISTRIBUTION.

1896-97.

COUNTRIES.	Coffee cwt Plan-tation	Coffee cwt N'tive	Coffee cwt Total.	Cinchona. 1897 B'nch & Trunk lb	Tea. 1897 lb.	Tea. 1896 lb.	Cocoa cwt.	C'moms lb.	Cinnamon. Bales lb.	Cinnamon. Chips lb.	Coconut Oil 1897 cwt.	Coconut Oil 1896 cwt.	P'bago 1897 cwt.
To United Kingdom ..	6068	..	6068	101646	50132235	48897533	17919	164674	462833	174362	23555	31427	77212
„ Austria	247	2	249	..	1755	28714	..	..	5100	16300	2952	14101	..
„ Belgium	.	1	1	..	5895	19147	53	..	30900	55048	199	1408	15101
„ France	599	..	599	..	4·066	37726	153	...	40000	16160	..	114	307
„ Germany . ..	179	..	179	..	144696	45075	54	26660	238895	283282	204	4868	37065
„ Holland ..	58	.	58	..	14505	3889	..	..	..	..	..	400	202
„ Italy . ..	..	.	.	..	3400	6777	..	..	67100	49280	269	506	1
„ Russia	..	..	..	..	176257	165657	..	..	..	..	...	26	..
„ Spain	..	..	..	..	9100	29800	..	..	99760	840	...	208	..
„ Sweden	..	..	...	..	25140	..	..	..	..	..	..	402	306
„ Turkey	..	..	..	..	4220	10692	...	..	..	..	.	..	..
„ India	43	..	43	...	349853	539315	5	87237	61	...	60862	25533	179
„ Australia	2210	132	2342	..	6419361	5751452	60	25	1000	25080	1587	1709	524
„ America	..	..	...	237983	423877	262238	47	..	50000	10000	10018	13564	28955
„ Africa	..	..	..	..	111787	45264	..	187	..	..	10	4	..
„ China	42	.	42	24873	259705	86603	..	..	..	..	266	2493	369
„ Singapore	..	35	35	..	13401	43377	356	..	..	..	27686	21828	..
„ Mauritius	..	..	..	..	..	48884	..	..	..	..	..	..	..
„ Malta	..	..	..	..	39110	67800	..	..	..	..	..	..	..
Total exports from 1st Jan. to 29th June 1897	9446	170	9616	364502	58179363		18647	278883	995649	630852	127548		160221
do 1896	10363	341	10704	570361	51080943		29564	184595	859999	425?44	118591		154311
do 895	36068	2235	38303	498973	45667796		18963	213742	693891	413292	143629		130539
do 894	12561	420	12911	1029998	58225500		11178	163761	616000	276493	189243		122592

MARKET RATES FOR OLD AND NEW PRODUCTS.

(From Lewis & Peat's Fortnightly Prices Current, London, June 2nd, 1897.)

	QUALITY.	QUOTATIONS.
ALOES, Soccotrine cwt.	Fair to fine dry ...	44s a 120s
Zanzibar & Hepatic ,,	Common to good ...	11s a 76s
BEES' WAX, ,,		
Zanzibar & { White ,,	Good to fine ...	£7 a £8
Bombay { Yellow ,,	Fair ..	£6 a £6 10s
Madagascar ,,	Dark to good palish ..	£5 15s a £6 7/6
CAMPHOR, China ,,	Fair average quality ...	95s a 100s
Japan ,,	,, ,, ,,	110s
CARDAMOMS, Malabar lb	Clipped, bold, bright, fine	3s a 3s 1d
	Middling, stalky & lean	2s 6d a 2s 9d
Ceylon.—Mysore ,,	Fair to fine plump ..	2s 6d a 3s 6d
	Seeds ...	3s a 3s 1d
,, Tellicherry,,	Good to fine ..	2s 9d a 3s
	Brownish ..	2s 6d
,, Long ,,	Shelly to good ...	2s a 2s 6d
,, Mangalore ,,	Med brown to good bold	3s 3d a 3s 6d
CASTOR OIL, Calcutta ,,	1sts and 2nds ...	3½d a 4½d
Madras ,,	...	3½d
CHILLIES, Zanzibar cwt.	Dull to fine bright ..	20s a 37s 6d
CINCHONA BARK.—		
Ceylon lb.	Ledgeriana Chips ...	1d a 3½d
	Crown, Renewed ..	2d a 4½d
	Org. Stem	1¼d a 3d
	Hybrid Root ...	2¼d a 2½d
	Chip ...	1¼d a 2d
CINNAMON, Ceylon 1sts	Ordinary to fine quill...	10½d a 1s 6d
per lb. 2nds	,, ,, ...	10d a 1s 5d
3rds	,, ,, ..	9½d a 1s 3d
4ths	,, ,, .	8½d a 1s
Chips	,, ,, .	2½d a 3d
CLOVES, Penang lb.	Dull to fine bright bold	4¼d a 9½d
Amboyna ..	Dull to fine ..	3d a 4½d
Zanzibar }	Good and fine bright .	2 3-16d a 2½d
and Pemba }	Common dull to fair ..	2d a 2⅛d
Stems ..	Fair ..	1d
COCULUS INDICUS cwt.	Fair ..	8s 6d
COFFEE		
Ceylon Plantation ,,	Bold to fine bold colory	114s a 120s
	Middling to fine mid .	108s a 113s
	Low mid. and low grown	98s a 106s
	Smalls ...	90s a 97s
Native ,,	Good ordinary ...	65s a 80s
Liberian ,,	Small to bold ...	40s a 65s
COCOA, Ceylon ,,	Bold to fine bold ...	70s a 80s
	Medium and fair ...	52s a 65s
	Triage to ordinary ...	30s a 50s
COLOMBO ROOT ,,	Fair to good ..	20s a 30s
COIR ROPE, Ceylon ton		nominal
Cochin ,,	Ordinary to fair ..	£10 a £16
FIBRE, Brush ,,	Ord. to fine long straight	£10 a £21
Cochin ,,	Ordinary to good clean	£15 a £21
Stuffing ,,	Common to fine ..	£5 a £6 10s
COIR YARN, Ceylon ,,	Common to superior	£12 a £26 10s
Cochin ,,	,, ,, very fine ...	£12 a £34
do. ,,	Roping, fair to good ...	£10 10s a £13
CROTON SEEDS, sift. cwt.	Fair to good ...	85s a 86s
CUTCH ,, ,,	Fair to fine dry ...	9s 3d a 32s 6d
GINGER, Bengal, rough ,,	Fair ...	15s 6d
Calicut, Cut A ,,	Good to fine bold ...	70s a 85s
B & C ,,	Small and medium ..	30s a 68s 6d
Cochin Rough ,,	Common to fine bold ..	24s a 36s
	Small and D's ...	10s a 27s 6d
Japan ,,	Unsplit ...	14s a 16s
GUM AMMONIACUM ,,	Sm. blocky to fine clean	17s a 36s 6d
ANIMI, Zanzibar ,,	Picked fine pale in sorts	£10 7s 6d a £13
	Part yellow and mixed	£7 17/6 a £10 10s
	Bean and Pea size ditto	70s a £7 12/6
	Amber and dk. red bold	£5 10s a £7 10s
	Med. & bold glassy sorts	90s a 137s 6d
Madagascar ,,	Fair to good palish ...	£4 8s a £8
	,, ,, red ...	£4 5s a £9
ARABIC E. I. & Aden ,,	Ordinary to good pale	40s a 62s 6d
Ghatti ,,	Pickings to fine pale ..	20s a 55s
Kurrachee ,,	Good and fine pale ...	55s a 65s
	Reddish to pale selected	35s a 45s
Madras ,,	Dark to fine pale ..	35s a 40s
ASSAFŒTIDA ,,	Clean fr. to gd. almonds	40s a 80s
	Ord. stony and blocky	30s a 37s
KINO ,,	Fine bright ..	£45 a £55
MYRRH, picked ,,	Fair to fine pale ...	82s 6d a 90s
Aden sorts ,,	Middling to good ..	33s a 65s
OLIBANUM, drop ,,	Good to fine white ...	34s a 60s
	Middling to fair ..	20s a 31s
pickings ,,	Low to good pale ...	11s a 12s 6d
siftings ,,	Slightly foul to fine ...	9s 6d a 14s
INDIARUBBER, Assam lb	Good to fine ...	1s 9d a 2s 4d
	Common to foul & mxd.	3d a 1s 6d
Rango	Fair to good clean ...	1s 4d a 2s 1d
Borneo ,,	Common to fine ..	1s 1d a 1s 7d

	QUALITY.	QUOTATIONS
INDIARUBBER, (Contd).		
Java, Sing. & Penang lb.	Foul to good clean ...	1s 3d a 2s 3d
	Good to fine Ball ..	2s 2d a 2s 6d
	Ordinary to fair Ball	1s 2d a 2s 1¾d
Mozambique ,,	Low sandy Ball .	10d a 1s 1d
	Sausage, fair to good	1s 4d a 2s 5¼d
	Liver and livery Ball...	1s 3½d a 2s 1¼d
	Fr to fine pinky & white	1s 11d a 2s 5d
Madagascar ,,	Fair to good black ...	1s 3d a 1s 10d
	Niggers, low to good...	10d a 1s 5d
INDIGO, E.I. ,,	Bengal--	
	Shipping mid to gd violet	4s 4d a 5s 1d
	Consuming mid. to gd.	3s 4d a 4s 1d
	Ordinary to mid. good	2s 8d a 3s 2d
	Mid. to good Kurpah...	2s a 2s 10d
	Low to ordinary ..	1s 3d a 1s 11d
	Mid. to good Madras...	1s 4d a 2s 6d
MACE, Bombay, & Penang	Pale reddish to fine ..	1s 9d a 2s 9d
per lb.	Ordinary to fair ..	1s 4d a 1s 8d
	Chips and dark	1s 1d a 1s 6d
MYRABOLANES, } cwt.	Dark to fine pale UG...	3s 9d a 5s 6d
Madras }	Fair Coast ..	4s 9d
Bombay ,,	Jubblepore ...	4s a 7s
	Bhimlies ...	4s 3d a 8s 6d
	Rhajpore, &c. ..	4s a 7s
Bengal ,,	Calcutta ..	4s a 6s
NUTMEGS— lb.	64's to 57's ...	3s a 3s 2d
Bombay & Penang ,,	112's to 67's ...	1s 3d a 2s 11d
	160's to 130's ..	8d a 1s 2d
NUTS, ARECA cwt.	Ordinary to fair fresh...	12s a 14s
NUX VOMICA, Bombay	Ordinary to middling...	6s a 6s 6d
per cwt. Madras	Fair to good bold fresh...	7s a 7s 6d
	Small ordinary and fair	6s 6d
OIL OF ANISEED lb.	Fair merchantable ...	6s 9d
CASSIA ,,	According to analysis..	6s 6d a 8s
LEMONGRASS ,,	Good flavour & colour...	2⅜d
NUTMEG ,,	Dingy to white ...	3¼d a 4d
CINNAMON ,,	Ordinary to fair sweet...	4d a 1s 3d
CITRONELLE ,,	Bright & good flavour...	1s 1½d a 1s 2d
ORCHELLA WEED—cwt		
Ceylon ,,	Mid. to fine not woody...	10s a 12s 6d
Zanzibar. ,,	Picked clean flat leaf ...	10s a 15s
	,, wiry Mozambique	10s a 11s
PEPPER—(Black) lb.		
Alleppee & Tellicherry	Fair to bold heavy ..	2¾d a 3⅛d
Singapore	Fair	3⅛d
Acheen & W. C. Penang	Dull to fine	2 7-16d a 2⅜d
PLUMBAGO, lump cwt.	Fair to fine bright bold	15s a 17s 6d
	Middling to good small	3s 6d a 13s
chips ,,	Dull to fine bright	1s 6d a 8s 9d
dust ,,	Ordinary to fine bright	2s a 6s
SAFFLOWER ,,	Good to fine pinky ...	80s a 85s
	Middling to fair ..	60s a 70s
	Inferior and pickings ...	50s a 55s
SANDAL WOOD—		
Bombay, Logs ton.	Fair to fine flavour ..	£20 a £35
Chips ,,	... ...	5s a £3
Madras, Logs ,,	Fair to good flavour ..	£30 a £50
Chips ,,	Inferior to fine ...	£4 a £8
SAPANWOOD Bombay ,,	Lean to good ...	£4 a £5
Madras ,,	Good average ...	£4 a £5 nom.
Manila ,,	{ Rough & rooty to good	£4 10s a £5 15s
Siam ,,	{ bold smooth ..	£6 a £7
SEEDLAC cwt.	Ord. dusty to gd. soluble	70s a 80s
SENNA, Tinnevelly lb	Good to fine bold green	4d a 8d
	Fair middling medium	2¼d a 4½d
	Common dark and small	1d a 2d
SHELLS, M. o'PEARL—		
Bombay cwt.	Bold and A's	£5 5s a £5 7/6
	D's and B's	£4 10s a £5 15s
	Small	£4
Mussel ,,	Small to bold ...	20s a 50s
TAMARINDS, Calcutta...	Mid. to fine bl'k not stony	7s a 8s 6d
per cwt. Madras	Stony and inferior ..	4s a 6s
TORTOISESHELL—		
Zanzibar & Bombay lb.	Small to bold dark mottle part heavy	17s a 23s
TURMERIC, Bengal cwt.	Fair	10s a 10s 6d
Madras ,,	Finger fair to fine bold	14s a 15s
Do. ,,	Mixed midlng. [bright	12s a 13s
Do. ,,	Bulbs	8s a 9s
Cochin ,,	Finger	12s
	Bulbs	7s 6d a 8s
VANILLOES— lb.		
Mauritius and } 1sts	Gd. crysallized 3½ a 9 in.	19s 6d a 33s
Bourbon ... } 2nds	Foxy & reddish 4½ a 8 ,,	17s a 22s
Seychelles 3rds	Lean and inferior ..	12s a 17s
VERMILION lb.	Fine, pure, bright ...	2s a 2s 1d
WAX, Japan, squares cwt.	Good white hard ...	42s

THE
AGRICULTURAL MAGAZINE,
COLOMBO.
Added as a Supplement Monthly to the "TROPICAL AGRICULTURIST."

The following pages include the Contents of the *Agricultural Magazine* for July :—

Vol. IX.] JULY, 1897. [No. 1.

OCCASIONAL NOTES.

We note with satisfaction that Mr. Willis, the new Director of the Royal Botanic Gardens, is bent on bringing together the sciences of Botany and Agriculture as allies in the development of the vegetable resources of the Colony. In a communication made by him to the *Government Gazette* of June 11th, he throws out some suggestions for carrying out this idea. We are glad to find that the end sought and the means proposed are such as we are in entire sympathy with. Indeed, we have already anticipated Mr. Willis in his suggestions as will be seen from past issues of the Magazine, and official annual and special reports to Government in which similar proposals have been made, over and over again. It does not, however, much matter with whom the proposals originated, so long as they are carried out.

An experiment in bee-keeping is about to be undertaken at the School of Agriculture, provided Government favours the project. There is indeed much to be studied in connection with apriculture in Ceylon, past experiments failing to a great extent owing to a too great reliance upon western methods and the adoption of European hives. Mr. Charles Andree, of Kurunegala, who has had considerable experience in bee-keeping has constructed a hive specially designed to suit the habits and requirements of the Ceylon honey bee. Two of these are now on view at the School of Agriculture. It is intended, as soon as sanction is obtained for the experiment, to stock the hives, and so give the students of the school an opportunity of learning the details of apiculture, an industry which, perhaps, more than any other, is suited to the conditions of our villagers. We shall have more to say about bee-keeing and the new Ceylon hive in our next.

We are glad to learn that Mr. Chinniah, the Government Veterinary scholar at the Bombay College, has received orders to thoroughly acquaint himself with the method of preventive inoculation for rinderpest recommended by Dr. Koch who is now in India. Quite lately it was stated that Dr. Edington of the Cape laid claim to have discovered a method of inoculation which renders the subjects operated on permanently immune, and alleged that Dr. Koch's metbod only confers temporary immunity. It would not do to give credit to a mere report such as this without hearing the facts of the case; we are therefore awaiting the Cape papers for full details as to Dr. Edington's experiments since Dr. Koch's departure from South Africa.

SEASON REPORTS FOR MAY.

Western Province.—Paddy. Yala sowing over, condition oi plants good. Except in the Pasdnm Korale, the supply of fruits and vegetables was good. A good yala harvest is anticipated.

Central Province.—Paddy. Maha harvest over in Kandy district, going on in Nuwara Eliya; in Matale, yala fields in plants. Prospects generally fair.

Northern Province.—Paddy. Threshing of Kalapokam paddy going on, and cultivating of Chirupokam progressing. Rainfall in Jaffna ·43 in., in Mannar ·10 in.

Southern Province.—Paddy and dry grain. Plentiful yala harvest expected in Galle district; fair prospects of paddy crop in Matara and Hambantota. Fruits and vegetables plentiful in Galle, scarce in Hambantota.

Eastern Province.—Paddy. Threshing of Munmari crops in progress in Batticaloa. The murrain in Batticaloa North has created a scarcity of buffaloes for ploughing. Prospects of pinmari crops in Trincomalee satisfactory. Tobacco harvested and dried and fetching higher prices than usual.

North-Western Province.—Crop prospects generally good.

North-Central Province.—Rainfall at Anuradhapura 1·15 in. Outlook for paddy generally satisfactory. A few cases of murrain among cattle, but active steps were taken to stamp them out.

Uva Province.—Paddy. Maha crop ripening, only middling owing to damage by flies. Fruits and vegetables plentiful and cheap.

Sabaragamuwa Province.—Paddy. Maha crop good on the whole, Yala sowing going on. Health of people and cattle satisfactory.

RAINFALL TAKEN AT THE SCHOOL OF AGRICULTURE DURING THE MONTH OF JUNE, 1897.

1	Tuesday	1·02	18	Friday	·23
2	Wednesday	·54	19	Saturday	·92
3	Thursday	·30	20	Sunday	2·27
4	Friday	1·50	21	Monday	·15
5	Saturday	·43	22	Tuesday	·53
6	Sunday	1·63	23	Wednesday	·57
7	Monday	·72	24	Thursday	Nil
8	Tuesday	·08	25	Friday	Nil
9	Wednesday	Nil	26	Saturday	Nil
10	Thursday	Nil	27	Sunday	Nil
11	Friday	·01	28	Monday	Nil
12	Saturday	·05	29	Tuesday	Nil
13	Sunday	·40	30	Wednesday	Nil
14	Monday	·70	1	Thursday	Nil
15	Tuesday	·13			
16	Wednesday	·12		Total	11·80
17	Thursday	·52		Mean	·39

Greatest amount of rainfall in any 24 hours on the 20th Sunday inches 2·27.

Recorded by A. R. JEREMIAH.

THE BORING BEETLE INFESTING CACAO.

"You have followed the correspondence about the boring beetle infesting cacao," said Fig.

"Well! I have, partially," replied Potts, who was an old man with something of the cynic in him and possessing the air of one who was not likely to be troubled very much with the conduct of beetles or anything else in life.

"Do you think" said the former "the ravages of this insect would ever likely put an end to the cacao industry of the colony by the extermination of the plant, as the *Hemileia vastatrix* destroyed the coffee?"

"You don't want the beetle" said the latter looking bored "to do that, so long as you have got the planter. Did he not prove himself to be the enemy of the coffee!"

"I envy your assurance" said Fig with a glare. "How do you make out that the planter who fosters his cacao with such care is its enemy."

"In the same way" replied Potts "that the fostering care of a child is inimical to a kitten, a robin or a grasshopper; or any other pet that a child may fancy. However well-meant its attentions may be, they are unsuited to the conditions of life of the pet, which falls a victim to its attentions."

"How did the Ceylon Planter kill the coffee plant" said Fig. "Did he not attend to its requirements?"

"Requirements"! exclaimed Potts. "Did it require to be cut down to 18 inches from the ground, any more than a fox terrier needs its tail to be docked and its ears trimmed so as to suit the tasce of the dog fancier! Did the laws of Nature or the results of evolution blunder in the length of tail given to the dog, or the height and shape given to the coffee plant?"

"But we had to cut the coffee tree down" said Fig "in order to facilitate the harvesting of our crop, and it bore a better berry under this treatmeant."

"So it did" interrupted Potts "for a time."

"And we pruned it, and handled it" continued Fig "and the bush was all the better for it."

"And you helped Nature" added Potts "as you think, by running counter to its established provisions."

"But we manured the plants liberally" said Fig.

"And stimulated the plant to bear heavy crops" echoed Potts "regardless of the requirements of the tree in other directions, which are as inscrutable to the agriculturist as a thousand other things are in Nature."

"But we had to get in our estimates" said Fig, "and we got them in successfully for many years."

"Yes" said Potts, "the crop was the principal object of your cultivation and the test of your estate. Everything was crop, you fixed your own standard of yield per acre. You fixed upon the height and shape of the bush. You fixed upon the rule that coffee should be grown in the open like the turf on a racecourse, regardless of the conditions under which the tree flourished in its native habitat where you found it. And you do not evince the least prick of conscience that you have done the least violence to that plant."

"Well" said Fig, "what have we done to the cacao plant?"

"You have cultivated it" said Potts. "Is that not enough"!

"Really" said Fig "you are very provoking."

"Where" said Potts "did you obtain your hints from for the cultivation of the cacao plant?"

"From the West Indies of course" said Fig "and other countries where the tree was cultivated before we got it."

"And where did the West Indian planters get their hints from regarding the treatment of fruit-bearing trees?" said Potts.

"From enlightened Europe" said Fig triumphantly. "See how successfully the farmers are with their apples and peaches in England."

"Yes, yes, that is alright in England" said Potts, "where your summer does not extend beyond three months in the year, and where the tree has rest

and in such a climate too that if the farmer did not prune and handle and attend to his trees in the way he does, he would probably get no crop at all. You have yet to satisfy me that this mode of culture is applicable to tropical agriculture ; that you should prune or handle, and so admit more sunlight and hot air to the trunk and stems of a cacao tree than Nature has provided."

"We don't prune the cacao now" said Fig.

"You don't prune the branches now" retorted Potts "I grant, but do you mean to say you do not use the knife at all ?"

"Yes, we do" replied Fig, "but that is only to take out the suckers.'

"And pray what is the sucker" ? queried Potts sarcastically. "It is a superfluous growth, I suppose, in your estimation, what Nature might well have dispensed with ! So the planter steps in with his cultured ideas and the pruning knife to correct a freak of Nature. Eh ?"

Fig appeared somewhat put out by this retort. But it was only for a moment.

"Why ! we should lose half the crops if we allowed the great big gormandizers to sap the tree" said he.

"Aye the crop again" said Potts. "Always in a hurry to harvest the crop. The main chance isn't it ? Why should we cultivate at all but for the crops you may say ; well, you are welcome to your crops, but have you any right then to complain if the tree which bore you these heavy crops under you stimulating attentions declined prematurely and came to an untimely end.'

"But they are not suffering from decay" said Fig, "it is the beetle *Tomicus perforans* that is doing the mischief."

"Then you have not drawn the most obvious conclusion from the correspondence before you" said the old man.

"Take the letter of Mr. Jas. R. Martin dated 13th June. Read the following paragraph :—

"We agree, however, on two points, first, that this disease is not a root disease; and secondly, that it is the work of a Poochie. Your correspondent is also certain that if a diseased tree is cut down, *the sucker which grows from the trunk, grows into a healthy tree.* This is most valuable. So on these three points something has been learnt."

"Now I venture to assert that if the beetle was indiscriminate in his attack, 'the sucker which grows from the trunk' grows not into a healthy tree, but continues to afford food and shelter to the beetle just as much as the other parts of the tree yielded before, and so the ravages would continue till not a vestige of the estate would be left. The study of the beetle, therefore, becomes a question of secondary importance, and the study of the tree the primary issue ; for this one fact alone, independently of others, affords incontrovertable proof, coming as it does in the testimony borne by the very planters who are charging the beetle with grave crimes and misdemeanours, that certain altered conditions in the sap, bark or wood of the tree have attracted the beetle to attack it."

"There is a good deal in that" said Fig.

"Now take the letter from Greenwood estate which appeared in the *Observer* of 7th May last," continued Potts.

"The writer would have it that any altered condition of the tree is not the source of attraction, and that the trees attacked are healthy."

"Yes," said Fig "the trees on that estate were healthy and robust and shewed no signs of decay."

"That" replied Potts "can be asserted only with a limitation as far as the human eye can discern. You can no more assert that certain stems and branches of the cacao on that estate had altered in their healthy condition and undergone chemical changes rendering them suitable to the wants of the beetle, because you do not see the changes perceived by the beetle only, any more than you can assert that the beetle should not attack Greenwood estate, because the proprietor chose to give it the name of Greenwood."

"Do you maintain" said Fig "that *Tomicus perforans* confines his attentions to decaying vegetation only ?"

"The evidence supplied by the correspondence certainly goes a long way to support the theory" said Potts. "The writer from Greenwood has cited the instance of an attack by *Tomicus* on the beer barrels in the Commissariat Stores of Burma and Lower Bengal, which the writer adds led to the naming of the insect 'Tippling Tommy' by the soldiers."

"Well now Tomny Atkins I think was not far out in associating *Tomicus* with fermented liquors."

"Take the instance given by the proprietor of Greenwood himself. The depraved beetle does not appear to have stopped at vulgar beer, for he is said to have broached the proprietor's wine casks in 1882." He says : "After two weeks I found one hogshead empty and of the other quarter had oozed out through a great many drillings made by 'Tommy.' These facts certainly point to a taste on the part of the insect for fermented juices and sap and vegetable matter undergoing the process of decay or fermentation, and it is quite possible that estates cultivated more in accordance with Nature's plans than after the methods invented by agriculturists for the increase of yield, would have less to complain about pests in general."

"Read," added Pots producing a paper from his pocket "the bulletin of the U.S. Department of Agriculture, to which Mr. E. Green drew attention, as bearing upon the Cocoa borer which belongs to the family *Scolytidae* about which the bulletin treats." Here is a notable extract from this bulletin: "As a rule, populous colonies of these beetles, and galleries so numerous and extensive as to be capable of doing serious harm, are found *only in trees which before the attack began were sick unto death with maladies for which the timber beetles are in no wise responsible.*"

"What then" said Fig "would you recommend the planter to do with regard to the suckers that invariably appear in the first few years of the life of a cacao tree ?"

"If" said Potts "Mr. Martin and his friends find the suckers such a perfect substitute for the trunk after its decay and destruction, it would be well to accept with humility the suggestion made by the tree to man that it is anticipating the evil day by putting out its suckers in time. It is a method of rejuvenating itself and guarding against dissolution, that the tree has, provided for it by the greater designer.

FRUIT CULTURE.

(*Continued.*)

THE CONSTRUCTION AND FUNCTION OF THE ROOT.

The fruit tree is fixed to the ground by means of the main root and its several branches. The root has a central cylinder of wood-tissue in which are large vessels, and round their woody cylinder is a layer of softer tissue which sheathes it completely and is distinguished at the cortex. In seedlings the outer of the root is extremely delicate, almost transparent, and absorptive of moisture. In a mature tree, however, the enlarged roots have entirely lost the power of vitally absorbing water from the soil: they collect nothing themselves, but in addition to fixing the tree firmly to the ground, conduct through their woody cylinder the fluid which has been conveyed from the soil for the use of the stem and leaves. The fluid material from the soil is then absorbed only by a portion behind the extreme end of each rootlet. This absorptive region is covered with fine root-hiars forming often a close pile like velvet, and thus enormously increasing the surface through which water can be taken in. Before these root-hairs become hard and discoloured they drop off, and the portion of the rootlet on which they grew is comparatively useless for purposes of absorption. Meanwhile, the tip of the root has pushed further into the soil; fresh root-hairs have developed on the newly-grown portion, and they in their turn fulfil the function required of them. The actual growing point absorbs but little; it is covered with a protective cup of tissue which is constantly wearing away and as constantly being renewed, so serving to protect the growing points from actual contact with the particles of the soil through which it has to force its way. Trees, therefore, which are transplanted without no ball of original earth round their base and with but few root-branches projecting below cannot immediately take anything from the soil when planted in a new spot. The first effort of life after replanting is to throw out new root-fibres, each with its protective cap to explore and forage in the fresh soil. As they elongate absorptive hairs cover the space of a few inches behind the cap and begin their functions, passing on the fluid taken up by them into the tissues of the root. As the lengthening proceeds, the hindermost hairs die off in a few days just in proportion as new ones arise behind the apex. Thus, it will be seen that the part of the root which absorbs is perpetually moving forward and coming in contact with unexhausted particles of soil instead of lying inactive among material which it has worked out. The root-hairs cling tenaciously to the particles they touch, and as it were mould themselves on them. Their moist surface is capable of disclosing traces of the mineral constituents contained therein, and the solution passes inward to the carrying system of the root. After having developed a certain number of rootlets and begun the process of absorption, the plant which may be said in the meantime to have been lying dormant begins to show signs of renewed vital activity once more.

Extreme care in lifting plants and preserving as much as possible its small fibres of the roots will repay the trouble taken. By doing this we give it less repairs to make good. In transplanting it is advisable to use a six-pronged fork, and to avoid as much as possible any cutting action that would be caused by such an implement as a spade or "mamotie."

With a knowledge of the above facts relative to the structure of the root system of plants and the method of absorption of plant food from the soil, the coarse method of chopping young trees out with a mamotie, so that they only have a few ragged stumps left in lieu of roots will, of course, never be tolerated. Such trees, when set in the ground, will have to begin life by "callusing"* the many wounds in the would tissue of their stumps, and then sending rootlets from this callus-layer, *just as if they were cuttings set so strike.* Indeed, they have not even the chance that ordinary cuttings get, for the stem and its numerous buds make immense demands upon the infant rootlets, far more than they can satisfy. And thus the miserable thing languishes, makes the poorest growth above, and gets thrown back a season or perhaps more, merely for want of reasonable care in transplanting.

In a tree planted in well-tilled, well-drained, well-opened soil, the advance of the root-tips continues till the limit of the tree's requirements is reached. In general, one may say that the expanse of the foliage of a fruit tree gives a tolerably accurate measure of the root-system under ground, but obviously the feeding ground of the roots is not close to the trunk, but in a circle whose radius is never less than half the height of the tree when matured. Those who have a knowledge of the steady advance in the roots described above will not therefore tolerate for a moment the custom of applying irrigation water or manure in a hollow dug round the base of the trunk, nor will they be consenting parties to the planting of trees in the holes cut in an impervious clay of soil which has never been trenched. The normal advance of the root system, under the latter circumstances, will be stopped by the impenetrable walls of the pit, and so the tree becomes unhealthy and short-lived in spite of doses of manure and irrigation.

(*To be continued.*)

* "Callusing" is the natural healing up of a wound such as is caused by cutting a part of a tree, and this is done by the tree by forming a spongy cushion of protective tissue known to gardeners as a "callus."

NOTES ON THE NORTH-CENTRAL PROVINCE.

This is a Province of tanks and ruins. In ancient times it was one of the most populous and productive parts of Ceylon; but now it is very unlike its former self. Although the largest Province in the Island, it is now the poorest in population and produce. It strikes a stranger at once that there is a large extent of waste land here; and he feels that this Province is capable of much agricultural development. The Government, well aware of this fact, have restored the ancient tanks and canals and are trying to encourage the people in the growing of paddy and other products. The water of most of the tanks contains a good deal of manurial matter in solution, and this combined with the natural rich-

ness of the soil makes it possible for the goyiya to carry on paddy cultivation without any special manuring.

2. The goyiyas, however, are slow to avail themselves of the facilities that have been given for cultivation. There is still a vast acreage under the tanks which can be asweddumized and converted into fertile paddy-fields. If the people of certain other parts, such as Jaffna, had as great facilities for the raising of paddy what results might we not expect.

3. These remarks apply to the cultivation of dry crops as well. The favourite form of dry cultivation with the villagers is "Chena" cultivation. But this has been prohibited, they complain, since of late. They do not, however, think of making fenced enclosures in their own compounds and growing vegetables &c. One could hardly get any vegetables in most of the villages, and even in Anuradhapura there is often a great scarcity of them.

4. Horticulture is another important branch of agriculture that is neglected in this province. Excellent fruit can be grown in many parts of it. The *Jaffna Patriot* says:—"We have heard that, in close proximity to the town of Anuradhapura, a garden of five acres cultivated with plantains only, yields five hundred rupees a year." Besides Anuradhapura and the villages adjoining it, there are many other localities where oranges, mangoes, bananas &c. thrive well. The productiveness of some of them is proverbial.

5. For instance, there is a village called Kidagollegama which, people say, was famous for fruit and other garden produce, and was styled "Parana Matale." The groves of fruit trees that used to grow in this village are still fresh in the minds of some of the oldest residents of the place. But this village has greatly declined in its fruit and garden culture owing to the lack of interest and enterprise of the villagers. There are many other villages in which scarcely any attempt has been made to grow garden produce or even coconuts, though the soil is sufficiently rich.

6. As regards coconuts it may be said that though they do not grow here quite so well as those along the sea coast, yet they will compare very favourably with the latter. Judging from the trees I have seen, I should think that a great part of this Province will suit coconuts as much as the Pallai district. Although proximity to the sea makes land particularly suitable for coconuts, one finds that, in this Province, in moist soils which contain a fair proportion of sand, the palm thrives and bears well; and if the villagers were enterprising enough, there would be many a flourishing coconut estate in this Province now, considering the fact that coconut planting is one of the safest and most remunerative forms of investment for natives. At present, however, by far the larger proportion of coconuts required for consumption in the Province is got from places outside it.

7. The people, although they fail to make the best of their opportunities, are more to be pitied than blamed, and have to be practically taught how they could better their condition by bringing more energy and enterprise to bear upon their cultivation. Their ignorance combined with a degeneracy of constitution brought on by the two great scourges of this Province, parangi and malaria, accounts for much of the present state of affairs.

8. By the wise policy of a benign Government, things have begun to improve since of late. Parangi and fever are becoming more scarce, and the people are getting more enlightened. The Government Agent is trying to induce the villagers to improve the state of agriculture in its various branches. One effect of discouraging chena cultivation is that people have taken more kindly to growing paddy.

9. There are three model gardens in Anuradhapura where vegetables and fruit trees are grown. One of these is under the Tissawewa and another under Basuvakulam. In these, in addition to superior native vegetables, are cultivated those English vegetables that will thrive in the low country. There are also grown, economic products new to the Province, such as the arrowroot and cotton. I noticed also about a thousand jak plants for free distribution among the villagers. It is curious to find that the jak which is a mainstay of the villagers in the Southern and Western Provinces in times of dearth and which supplies them with food all round the year, is very scarce in this Province; and the Government Agent noticing this fact and recognizing the usefulness of the tree, has got these seedlings raised for distribution among the villagers.

These two gardens were formerly in charge of Mr. Ranesinghe, Agricultural Instructor. The third one is the Botanical and Experimental Garden from which plants of economic value are given away or sold to the villagers.

10. The last item in the Jubilee programme in Anuradhapura is to be an AgriHorticultural Show which is to come off on the 26th. This, though the last, will not be the least event in the local celebration. It will give a stimulus to the goyiyas to go in more largely for the raising of superior varieties of agri-horticultural products. Only exhibits grown in this Province will be received for competition at this Show, and separate prizes will be given for the best collection from each "Palata." It would be desirable to hold such exhibitions here annually.

11. But after the natives of the Province have done their best, there will be a large extent of land still left which can be converted into paddy-fields, coconut estates, orchards and vegetable gardens. Now that we are within measurable distance of the day when the railway will be extended to Anuradhapura and Jaffna, it is high time for Ceylonese living in the crowded and congested parts of the South-West and North of the Island to think of coming over to this Province and opening large estates. Capitalists will find it a profitable investment.

The clearing of jungles, the drainage, &c. which the extended cultivation will involve, will help to remove the malaria and improve the health of the Province; and with the opening of new roads, the extension of the railway, and the plying of boats across the large sheets of water such as Kalawewa, Nuwarawewa and Minneriya, for carrying the produce of the villages, the North-Central Province may, at no distant date, attain to a state of prosperity which it had never enjoyed before.

12. For the breeding and rearing of cattle, sheep and goats this Province is second to no other in the Island. The fertile district of Tamankaduwa, once called the granary of Ceylon, and now the largest cattle district in the Province, affords special facilities for this purpose, as there are large tracts of rich pasturage in it.

Pony-breeding, too, is carried on to a certain extent in this Province; but, instead of the haphazard way in which this is done, if proper breeding establishments were started here as in India, importing good stallions and castrating the "weeds," both pony and mule-breeding can be carried on with highly satisfactory results.

E. T. HOOLE.

Anuradhapura, 21st June, 1897.

DISEASES OF TREES.

(Mr. N. A. Cott in the *Agricultural Gazette of N.S. Wales.*)

Every year brings me a number of enquiries as to the cause of the death of the whole or parts of trees, generally fruit trees, under peculiar circumstances, such as the absence of any apparent cause, or, at least, adequate cause. Sometimes the deaths are sudden, sometimes not; but in most such cases the disease has not been prolonged. These cases must not be confounded with death from lack of nourishment or care, or from old age. A tree in good soil or hitherto vigorous, suddenly sickens and dies, or perhaps manages to hold out for a season or two and then dies; such is the typical case to which I refer.

In such instances we at once suspect one of two causes, namely, insects boring in the wood, or the presence of some timber-rotting fungus. In the former case the death of the tree or branch is often sudden. The leaves will dry up and turn brown, as if a fire had scorched them, the whole operation sometimes occupying only a few days. If a limb be cut away and split up, the boring insects are usually discovered. Their holes may usually be seen on the surface.

In the second case the death of the tree is usually slower, and the cause is commonly more hidden from sight. The wood of the dead tree, however, on being examined carefully, or compared with healthy wood of the same kind, exhibits the peculiarities well known to timber merchants and carpenters under the name of *dry-rot*. The diseased wood is softer and more brittle than sound wood, and differs also in colour, and finally becomes punk and falls to pieces. This deterioration is due to the presence among the fibres of the wood of the hyphæ or vegetative organs of a fungus whose fruit may sometimes be seen either growing out from the bark in the form of "shelves" or "brackets," or in the form of toad-stools near the base of the tree. Strange as it may seem, the microscopic "roots," as we may almost call the vegetative organs of these fungi, penetrate long distances into the solid wood of the tree, where, by gradually absorbing and changing the substance of the cells of the wood, they weaken it and give rise to the well-known appearance of dry-rot. The death of the whole or part of the tree follows as a matter of course.

Both these conditions may occur in the same tree, and it is therefore well to have a clear idea as possible of the external appearance due to each of these diseases.

Remedies.

1. Trees dead or dying from either of these causes should be burnt. If there is reason to attribute the death to dry-rot fungi, the stump and main roots should also be destroyed by fire and the ground treated with quicklime.
2. Keep the place free from rotting and decayed timber. Such only forms a nidus, from which spring the spores of the dry-rot fungi.
3. Where timber-rot is prevalent, take the precaution to disinfect with tar the wounds on trees, either those caused accidentally or by pruning. In pruning be careful to use sharp tools, and to use them skilfully, and cut off the limbs close to the trunk or main branch that bears them, the idea being to give the tree a good chance to heal the wound as rapidly as possible.
4. Remove superfluous bark, and whitewash the trunk and main branches.
5. Where a wound fails to heal over, and becomes a sore, cut away the wood.
6. Look out that the drainage is good. This is a most important percaution against timber-destroying fungi. Damp, ill-drained plantations are their natural home.
7. As regards the remedies for borers, it is necessary to point out that they are, for the most part, totally different to the preceding ones, directed, as they are, against an insect instead of a fungus. It is when I observe remedies for fungi being applied to trees suffering from borers, and *vice versa*, that I realise how necessary it is to point out the possibility of being deceived as to the nature of diseases through resemblances in their external appearances. Is is a waste of money and energy to apply the wrong remedies. It would be of little use to apply fungicides to a tree attacked by the borer alone, or to adopt the following remedies against borers for dryrot fungi:—

1. Remove from the vicinity, unless they are serving some useful purpose, all native trees that are found to harbour the borer.
2. Spray the trees with tar-water, or some other substance that will be so offensive to the female that she will decline to lay her eggs there.
3. Remove loose bark, and whitewash the trunk and main branches.
4. Squirt or otherwise insert into all holes and crevices to be found, such liquids as kerosene emulsion or phenyl.
5. Set lighted lanterns at night, in the proper season, and so arrange them that the attracted and dazed moth (where the mature insect is a moth) will fly against rags and dangling strings soaked in kerosene, or some very sticky surface.

NOTES FROM A TRAVELLER'S DIARY.

(*Continued.*)

Again, as regards paddy cultivation, anyone who goes about the country with his eyes open cannot but be surprised at the crude methods practised by some of the villagers in the cultivation of the staple food product of the island. In Burma and other countries where rice is extensively grown and exported in large quantities, the most approved methods, such as the nursery system, transplanting, and weeding are invariably carried out, and the result is an enormously large crop, something like ninety-fold. In some of the Kandyan districts of this island the preparation of the land is apparently most carefully carried out, and weeding is also practised. These methods are, however, confined to only a very small area of the island, and the people even here have as yet to learn a great deal as regards the most approved methods of preparing the land and various other details, such as the selection of seed paddy &c.

Sir Arthur Havelock, our late Governor, speaking at a prize-giving of the School of Agriculture said: "I was particularly interested by those passages in the report of the Superintendent which deal with

the results of experiments in the improvement of paddy cultivation. . . it is pitiful to hear of the results of the general run of paddy cultivation in this country. One sees an immense amount of time, labour, and patience expended in cultivating those fields, and the result, we are tol l is very often of the poorest description, far behind the result of the paddy cultivated in Indi . or Burma. In certain portions of the Colony in which I have ridden about, I have made a point of trying to discover, from those who were with me, what was the yield of the fields through which we had been passing. I have often seen fields most beautifully cultivated, there being most painstaking arrangements for irrigation, for damming water, for ploughing, and for every other possible item of cultivation, and I have been told that probably the results may be six-fold or four-fold. I have it on the authority of one of our Government Agents that in his province there are many fields which do not yield more than five-fold. The work of this institution therefore in promoting the improvement of paddy cultivation is, I supp. e of all its various works, the most important and the most practical. For that reason I am particularly glad to hear of the satisfactory results that have been attained, and I can only hope that by every possible expedient, by the introduction of new forms of cultivation, and by the importation possibly of new kinds of paddy seed, the work of the College will profit the couutry."

Mr. H. W. Green, the founder of this institution, who had always been a keen observer of the various methods of cultivation as practised in the country, on same occasion spoke as follows :—"His Excellency had remarked on the absurdly and lamentably low yield of paddy. It was absurd and it was lamentable. He had also remarked on the beautiful cultivation of the fields and irrigation lands. If it were no heresy, might he (the speaker) say that it was beautiful on the outside, that everthing except the first step was beautifully done. It was like the house built on sand that we read about in a certain old book. The house might be beautiful, but there was no foundation. The Sinhalese cultivator and the Tamil cultivator in some districts—not in Jaffna and districts where water was scarce, but wherever water was plentiful—was inclined to begin at the top without the bottom. He forgot that, however bountiful nature might be in giving him rain or tanks for irrigation, he must prepare the soil for the water. He began to prepare the soil with the water on it. He said this method killed the weeds, and if he spoke the truth he would also say that it saved trouble; but he should plough the land when it was dry, turn the whole thing over and leave it to the baking of the sun for two or three months before the water and the beautiful cultivation came on. That was the one sole foundation fault of paddy cultivation in this country."

I quote further from Mr. Green's speech :—

"Wherever the experiments taught at that school had been tried honestly—they had always been honestly tried—it had been found that where the land had been thoroughly turned up and prepared, they had at least double the crop of their neighbours, and often more than double. If the people would only work carefully, there was no reason why we in Ceylon should not have the Burma yield. The climate was all right, everything was all right, but they did not prepare the soil for the working of bountiful providence." Again Mr. Green says: "That his primay object in starting the school was to help small agriculturists, and not the big ones—small owners of little tracts of land who suffered distress from want of food—that want of food he had seen, and he was satisfied that it was caused by the people not knowing what to do with what they had. They threw away 3 bushels of paddy in sowing when 10 seers would be enough, and this saving of seed paddy would keep a family in comparative comfort for a month or 6 weeks, and that in a time of famine and distress was a great thing."

On the face of what has so far been said regarding the cultivation of paddy in this island, it is impossible to deny that there is a great deal to be taught to the villager in this branch of agriculture. A few of the students trained at the school were sent out to the country expressly with the view of showing improved methods of paddy cultivation to the villagers. The experiments conducted by these young men from all we gather from records, have been in almost every case a very great success, and the villagers have in some instances learnt much from them. But in a country like this, where the people are so conservative, it is impossible to create a lasting impression upom them by experiments conducted in a haphazard manner here and there. A series of experiments for a great length of time at each place and under proper guidance should have been systematically carried out. Unfortunately, this has not been done. Young instructors were in most cases placed under the guidance of the native chiefs of the districts. These chiefs have not received any training in agriculture, and they themselves are as ignorant as the ordinary villager in these matters. Mr. Elliott, late Government Agent, speaking at a prize-day of the School of Agriculture explained the true position of the instructors in the following words :—"They had heard of what was doing within these walls, but he could give some account of what former students had done elsewhere, especially in the Eastern Province. He had had their co-operation in several of the agricultural experiments, and was happy to be able to testify that they were all a credit to the school in which they were trained. They were capable agriculturists and intelligent workmen, who understood their work, and knew how and when to plough, to sow, to water and to reap. They were, however handicapped in their work and were rather expected like the Hebrew of old to make bricks without straw. They had no money, no seed paddy, no implements given them, but were generally attached to an ordinary village school and expected to cultivate paddy in an improved style. Progress under such circumstances, was difficult, and their motto must be taken from the tortoise rather than the hare—'slow but sure.'" The Hon'ble Mr. Mitchell, Mercantile Representative of the Legislative Council, has expressed the following opinion :—"With regard to the good the school was doing nobody could be blind to that. Lads came from the country and studied agriculture there, and went

back to their villages or other Agricultural Schools, and no one could be bliud to the fact that very important results must follow from that in the course of time."

TRAVELLER.

(To be continued.)

POTASH MANURES AND THE NEED FOR SPECIAL POTASH FERTILIZERS.

(Continued.)

The great source of potash manures are the Stassfurt deposits. Ever since the beginning of last century the district of Stassfurt, in the province of Saxony, in North Germany, has been well known as the centre of a large salt industry. The salt was formerly obtained by pumping up liquid from wells, and evaporating it in pans. The discovery of solid rock salt had the effect, however, of soon rendering this industry non-lucrative; and hence, in the year 1839, the Prussian Government instituted a series of investigations for the purpose of discovering whether rock salt could not be found at Stassfurt. At first the attempts were unsuccessful, but in 1857 a stratum of rock salt was discovered about 1000 feet below the surface. This deposit lay below a large layer of what were called Abraum salts (refuse salts), which consisted of compounds of potash and magnesia. For a number of years little value was attached to these deposits, as their importance in agriculture at that time was not known. After a time, however, potash began to be extracted from these salts for use in various chemical manufactures. The value of potash as a manure for farm crops was also demonstrated by the researches of Liebig, and its employment for this purpose became more and more extensive with the lapse of time. At the present time the potash industry in Stassfurt has reached enormous dimensions, and every year the amount of potash exported thence to all parts of the world for fertilising purposes is steadily increasing. Stassfurt has now become the centre of one of the largest manufacturing industries in Germany, and employs about 10,000 operatives in connection with potash mining and manufacture in Germany. Not much short of two million tons of Potash Salts are annually produced in the Stassfurt districts.

It is believed that these salts were formed by the partial isolation of a sea, the waters of which still maintained communication with the ocean for a long time, by means of small channels. This was thousands of years ago, and the climate of that part of Europe was then more of a tropical nature than it is at present. The result of these conditions was the steady evaporation of these partially isolated lakes of salt water, and the constant accumulation of the salt deposits. The less soluble salts were first deposited, such as sulphate of lime, and in this way the lowermost layer of the deposit, which consists largely of this substance, was formed. Above this was deposited the rock salt. This stratum, which is about 3,000 feet deep, is estimated to have taken 13,000 years in its formation. In the upper regions of the deposit lies the potash layer, consisting largely of a mineral known as carnallit, which consists of muriate of potash and chloride of magnesia. This deposit is from 50 to 130 feet thick, and is the chief source of the potash salts. Above the potash there is a layer of impervious clay, which serves a very useful purpose in protecting the carnallit from being dissolved by the water, which would otherwise have been constantly percolating down through the soil; indeed, had it not been for this layer of clay, it is highly probable that the potash, as well as the magnesia salts, would long ago have been washed out of these deposits. Above the clay lies another stratum of anhydrit, and above it a second salt deposit, which is of very much more recent formation than the first, and is characterised by its great purity.

The enormous extent of these deposits may be estimated from the fact that their total depth amounts to about 5,000 feet, or nearly a mile; while the deposits extend over an area of several thousand square miles directly east of the Harz mountains. Here and there, irregularities occur in the sequence of the different deposits. At some places surface water has entered, and, by its solvent action, dissolved out certain of the potash compounds, or changed them into other compounds. Hence, there occurs throughout the surface, deposists of such substances as kainit and sylvinit, both crystallised salts of potash, the former made up of a mixture of the sulphate and chlorides of potash and magnesia, and the latter of a mixture of muriate of potash, rock salt, and kainit. The extent of these deposits is so vast that they may be regarded as practically inexhaustible, or, at any rate, as sufficient to supply the world with potash for many generations to come.

In Germany, quite a number of the raw potash salts are used for manurial purposes, as they can be obtained very cheaply; but the more concentrated salts are preferred for export, owing to the greater relative expense incurred in the freight and handing of the impure forms. The chief amount of potash exported is in the forms of the refined potash salts, viz., muriate and sulphate of potash, and in the less pure form of kainit. The composition of some of the more commonly occurring crude potash salts is, however, deserving of notice.

Carnallit, which is the most important, contains about 26 per cent. of muriate of potash. It is found of a variety of colours, caused by the admixture of such impurities as iron, clay, and organic matters; and may be white, yellow, red, violet, grey, or even black. It is hardly ever found in the pure condition, and, as mined, generally contains only about 60 per per cent. of carnallit, the other 40 per cent. being made up chiefly of rock salt, kieserit, anhydrit and clay. It is sold for agricultural purposes in the form of a powder, and is guaranteed to contain at least 9 per cent. of potash, equal to about 14 per cent. of muriate of potash.

Kainit, like carnallit, is found of a variety of colours, and never in the pure condition; but contains more or less rock salt and other impurites. As sold for agricultural purposes, it is usually guaranteed to contain 12½ per cent. of potash.

Sylvinit is the third crude salt, and contains, on an average, 22 to 30 per cent. of muriate of potash. It thus sometimes contains more potash than kainit.

All these crude forms of potash are extensively used, and are most suitable for the districts adjacent to the mines, or to which there exists convenient and cheap transport. Where the cost of carriage is considerable, the refined and more concentarted potash salts are more suitable, and if account be also taken of the relative expenses of cartage and labour, their use is generally found to be considerably economical.

The salts are made of various qualities and are chiefly prepared from carnallit. The method of preparation is as follows:—The carnallit is agitated with water in large tanks with the result that it is decomposed into a magma of finely-crystallised muriate of potash and a solution of magnesium chloride. The solution retains very little muriate of potash at a low temperature, and where the proportion of magnesium chloride does not exceed three times of the muriate of potash, the remainder of the muriate is deposited as crystals on further heating and cooling. The fine crystals of muriate of potash are further dissolved and purified by crystallisation.

Muriate of potash as sent into the markets and used for manure is usually guaranteed to contain from 82 to 90 per cent. of muriate, equal to about from 50 to 58 per cent. of potash. Two classes of sulphate of potash are also sold, viz,, what is known as high grade sulphate containing 92 to 98 per cent. of the sulphate and equal to 50 to 53 of potash, and low gade sulphate containiug 50 per cent. sulphate equal to 27 per cent. potash.

INSECT PESTS.

(*Continued.*)

For almost every insect there is a remedy ; the question generally is one of applying. There is no sovereign remedy for all insects ; for some insects, and important ones too, there is no economical remedy; but there are certain general measures which if faithfully carried out will largely decrease loss from insect attack. The most important of these is clean culture and high culture.

A great many insect pests lie dormant in cultivated lands at certain seasons finding shelter in old stubble, stalk, leaves and other rubbish found on the land. From such places they come forth at other seasons and ready to carry on their destructive work on vegetation. Obviously, much benefit would here result from clean culture. The gathering of all rubbish, dead vegetable matter, and other refuse, and having it burned or properly composed would destroy an immense number of these insects. Diseased branches of trees should also be burnt and the trunks and branches of standing trees kept free of moss, lichens and rough bark, beneath which insects or their eggs are harboured. Weeds and foreign growth should not be tolerated along fences, walls or hedges. Clean culture is the stitch in time to save nine.

High culture is almost equally important in warding off insect attack or rather in enabling the plant to overcome it. While the plant which is weak and sickly through lack of proper cultivation or needed fertilizing material in the soil succumbs to the attack of insects, the plant which is properly cultivated is often able to overcome the attack and mature in good condition despite the drain upon its vitality. Particularly is this true of vegetables.

Fruit trees kept in vigorous growth may scarcely appear to be affected by infesting scale insects, while trees poorly nourished and uncultivated are found losing vitality along its branches when attacked to a like extent. Some insects also show a decided preference for plants making only a feeble growth, and many writers on entomology assert that certain insects never attack a plant unless it is in an unhealthy condition. The second great principle in preventing insect injury is, then, keeping the crops well fed and properly cultivated.

In addition to the measures already noted, the judicious agriculturist will, whenever possible, make a judicious rotation of crops to repress insect ravages. Many insects, as well as diseases, are kept down solely by this means which is economy for other reasons as well. Such insects being capable of subsisting only on a certain plant or class of plants, are destroyed by starvation when the soil is used for the growth of other plants.

[In the case of permanent forms of cultivation the nearest substitute for a rotation of crops is, as we have previously pointed out in these pages, mixed cropping.]

But many insects cannot be controlled by these general methods of culture and need to be dealt with by more artificial means. Much attention has been paid to such means within the last generation, and several very valuable insecticides have as a result been brought into common use. It is the duty of the agriculturist to be acquainted with the best of these insecticides and find out for what they are applicable, since an insecticide that answers perfectly for one insect may be totally inadequate for another.

In general insecticides may be divided into two classes : those which kill by contact and those which kill by internal poisoning. For the judicious use of both kinds it is important that we should recognise that insects are also divisible into two large groups according to their method of taking food. One class of insects, which embrace locusts, caterpillars and beetles, takes solid food by means of biting jaws, while the other which embraces bugs, scale insects, bark lice and the like, takes only liquid food imbibed through a proboscis. Insects of the first kind can be disposed off with tolerable ease by applying poisons such as arsenites to their food, while insects of the second type are clearly beyond the reach of such poisons. Their method of taking food affixes them more or less permanently to the surface they are on, and through which they suck in their food, so that they are vulnerable to penetrating insecticides such as kerosene emulsion which further close up their breathing pores and thus suffocate them.

SOME CROP NOTES.

Onions.—Onions do best upon a light, loamy soil, and one that has been kept free from weeds by careful cultivation. They can be grown for a number of years on the same land if properly fertilized. Onions thrive well on soils which contain much humus, and which is consequently retentive of moisture. It is well to have onions preceded

by a crop which is calculated to free the land of weeds. Onions need lime for their development, and to make good crops they require heavy manuring. Commercial fertilizers are better for onions than animal manures, since the former contain no seed-producing weeds. About 1,500 lbs. of a fertilizer with the essential ingredients in the following proportions is recommended:—

Available phosphoric acid, 6 per cent; potash, 7 per cent; and nitrogen, 4 per cent. One practice in planting is to use sets or small bulbs grown the previous year from thickly-grown seed; but good crops can be raised from the black seed by sowing early. Stable manure is objectionable for onions for the reason that it fosters the onion maggot. On rich humus soils, a maximum of phosphoric acid and potash should be applied, and only a small quantity of nitrogen. Too much nitrogen is also objectionable, as it retards the ripening and curing.

Tomatoes.—Tomatoes prefer a light, warm soil though it thrives in other soils as well; the latter situations help in the production of early fruit, while heavy soils produce late fruit. A good substantial manuring should consist of about 1,200 lbs. per acre of a fertilizer containing: available phosphoric acid, 7 per cent; potash, 6 per cent; and nitrogen, 4 per cent. The tomato needs a good supply of readily-available nitrogen, but besides this good supplies of phosphoric acid and potash are required.

The best plan is to sow the seed in shallow boxes in a warm situation. As soon as the plants have developed the second set of leaves, transplant them into other boxes a little deeper and put the plants about two inches apart. If they could be again transplanted two or three weeks before sowing and put about four inches apart so much the better. Care should be taken to gradually expose the plants more and more so as to harden them to the open air and make them stout and short. Plants treated in this way could be set out with ease and come into fruit a month or more sooner than those sown in the open air. In field culture the plants are set four by five feet apart, but in gardens where room is scarce it is well to train them up in some manner, and for this purpose galvanized wire netting fastened to stakes is best used. Where there is plenty of room larger crops can be had by allowing the plants to fall on the ground, but keeping the fruits off it. Where tomatoes are affected by blight, spray with Bordeaux mixture.

[*Bordeaux mixture for Tomatoes*:—Take 2 oz. of sulphate of copper (blue stone) and dissolve in half a gallon of water in one vessel, slake 2 oz. quicklime in another vessel forming it into a thin white wash. Pour the milk of lime into the sulphate of copper solution slowly through a hair sieve, then add enough water to make up 3½ gallons; stir well and apply to every part of the plant, coating them evenly with the thinnest possible film of the mixture. It will not injure green fruit for use, but those near ripening should be cut, as it is not desirable to use the mixture over ripening fruit. The lime should be quite fresh and the blue stone pure.]

GENERAL ITEMS.

In a bulletin issued by the Department of Agriculture, N. S. Wales, the following measures are recommended for wood borers: Inject turpentine or oil into the hole; cut off infected limbs and burn and destroy perfect beetles whenever seen.

In Bulletin No. 13 of the Department of Agriculture, Brisbane, Mr. Albert Benson writes as follows with reference to insects boring into the roots, stem or branches: These are true boring insects, and are usually the larvae of beetles of various kinds. Some of these beetles are leaf-eaters, and can be destroyed by spraying with Paris green; others, again, can be destroyed by placing a cloth under the trees and then giving the branches a few sharp raps, when all the insects will fall to the ground, and can be swept off the sheet and destroyed. When the insects are in the larval or borer stage, if they are of large size they can be killed by inserting a fine pliable wire into their burrows, or by injecting a small quantity of kerosene or turpentine into their burrows, and plugging up the outlet with a piece of soft wood or clay. In any case when borers are at all troublesome, the mature insect (generally beetles) should be destroyed whenever and wherever they are found.

We take the following remarks with reference to Agricultural Shows from the *Cape Agricultural Journal*:—That Agricultural Shows should be held with a two-fold purpose is not often as much considered as it ought to be. As a means of affording a vast amount of useful information to the farming community, there can be no doubt that agricultural exhibitions are excellent institutions. The concentration of a large number of high-class exhibits in some populous centre, and the keen competition that takes place in the various classes, must necessarily serve an important educational purpose and furnish reliable mediums for imparting useful practical knowledge. If Agricultural Shows are to be conducted in such a manner as not to serve an educational purpose, then they become *worse than useless*. To be both useful and instructive they must be conducted in a manner that the largest number of varied exhibits possible will be brought together in competition for prizes. If we really believe in the utility and value of the educational side of the Show, then every facility should be given and efforts made to render the suggestive information of the Show easily available, especially in the interests of any young farmers and men who have not many like opportunities.

Professor Wrightson in his paper, contributed to the Journal of the Royal Agricultural Society, on "The Agricultural Lessons of 'the Eighties'", says:—Of this we may be assured, that one of the greatest lessons taught by the eighties is the necessity of the systematic instruction in Agriculture in all its branches.

In the year 1895, the mean rainfall for the whole of England and Wales was 29 in., for the whole of Scotland 39·7 in., and for the whole of Ireland 36·8 in. The averages for the last thirty years are for the three countries respectively 32 in., 40·4 in., and 39·4 in.